TEXTILE RESEARCH

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Annual Meeting Program

POSTPONEMENT of the date of the annual meeting of U. S. Institute for Textile Research from Nov. 4th to Friday, Nov. 12th, which was necessary to ensure the attendance of certain officers and speakers, has made possible improvement of the conference and dinner programs, and promises to increase attendance at these functions. Members were notified of the postponement in calls for the meeting mailed Oct. 21st, and the numerous dinner reservations received since then indicate that the new date has been found more satisfactory than the old one, particularly for members living at a distance from New York City; possibly because the holiday Nov. 11th allows them to combine attendance at our meetings and dinner with the long week-end visit in the metropolis.

The conveniently located, and refurnished and redecorated Hotel Commodore is the place of meeting. The meeting of members will be held in Parlors A and B at 11 A. M., the research conference in the same rooms at 2 P. M., with Parlor C added if necessary, and the dinner in the East Ball Room at 7 P. M.

Textile Research Progress

As all of the addresses and papers, and also the formal annual reports, will record actual progress of research, the theme selected for the meeting is Textile Research Progress. Perhaps its more accurate definition should include the word "associational," for the research to be reported and discussed is that of the following organizations: Textile Foundation, Chemical Foundation, American Association of Textile Chemists and Colorists, and U. S. Institute for Textile Research.

At the dinner, progress of The Survey of Production and Distribution Organization in the Textile Industries, now nearing completion at the Wharton School of Finance and Commerce, University of Pennsylvania, will be reported by Dean Joseph H. Willits and his associates, Messrs. Balderston, Taylor and Davis. At the same function Dr. Wanda K. Farr will report notable recent progress in the Chemical Foundation's research on the

chemistry of cellulose, her subject being "Cellulose" Analyses. At the open research conference in the afternoon research associates of U. S. Institute and of the A. A. T. C. C. will discuss the work on which they are engaged. At the latter meeting there will be an opportunity for open discussion and the suggestion of new research subjects.

Because U. S. Institute for Textile Research is a clearing house for research to the textile industry, and because so many of the researches to be discussed at this meeting are those of other organizations, and are of interest to large numbers of textile men and women who are not members of U. S. Institute, it has been deemed only fair to open the afternoon conference and the dinner to members of all co-operating associations. There is no registration charge for the afternoon conference, but that for the dinner will be the same as to U. S. Institute members, or $5.00. It is hoped that members will bring this invitation to the attention of all whom they think may be interested, and also that they will not overlook the fact that they are privileged to have guests, including ladies. Dress at the dinner may be formal or informal.

Because of an anticipated large demand for dinner tickets from non-members it is highly important that members forward dinner reservations for themselves and guests at the earliest opportunity. On paid orders received prior to Nov. 9 dinner tickets will be delivered by mail. On reservations or orders received later tickets will be delivered by the Secretary at the meeting or dinner.

The Tentative Program

10:30 A. M.—Meeting of Board of Directors.

11 A. M. (Adjourned from 10 A. M.).—Annual meeting of Members for presentation of formal reports and election of Directors. (See Agenda and list of Directors whose terms will have expired.)

12:30 P. M.—Intermission for Luncheon.

2 P. M.—Open Research Conference (Parlors A, B and C). Chairman, W. E. Emley, Chairman, Research Council of U. S. Institute.

It is expected that Dr. W. E. Yelland, director of U. S. Institute's research on warp sizing and sizing materials, and Dr. J.

G. Wiegerink, director of U. S. Institute's research on textile drying, will be present and will explain the programs on which they are engaged.

Prof. Louis A. Olney, chairman, Research Committee of the A. A. T. C. C., and a vice-president and director of U. S. Institute, has promised to introduce the following research associates of the A. A. T. C. C. who will report on results of their work: Dr. Milton Harris on The Chemistry of Wool; Dr. S. N. Glarum on Vat Printing Pastes; and Mr. Bertil A. Ryberg on Methods of Determining Oil, Soap and Other Extraneous Matter in Textile Materials.

7 P. M.—The Annual Dinner (East Ball Room). Presiding: Dr. E. H. Killheffer, Executive Vice-President of U. S. Institute.

Address.—Hon. Francis P. Garvan, President, The Chemical Foundation and U. S. Institute for Textile Research.

Address.—"Progress of the Survey of Production and Distribution Organization in the Textile Industries." Dean Joseph H. Willits of Wharton School of Finance and Commerce, University of Pennsylvania, and his associates, Messrs. Balderston, Davis and Taylor.

This is a joint research financed by the Textile Foundation and organized by U. S. Institute with the co-operation of 14 other leading associations of textile manufacturers and merchants.

Address.—" 'Cellulose' Analyses." Dr. Wanda K. Farr, Director of the Chemical Foundation's research on the Chemistry of Cellulose at Boyce Thompson Institute for Plant Research.

Agenda for Annual Meeting

1.—Minutes of last meeting.
2.—Report of Board of Directors.
3.—Report of Treasurer.
4.—Report of Auditor.
5.—Report of Secretary.
6.—Report of Research Council.
7.—Report of Nominating Committee.
8.—Election of New Directors.
9.—New Business.

(*Continued to P. 14.*)

Load-Versus-Compression Characteristics in Gelatins and Allied Sizing Materials

By DR. IRVING J. SAXL *

Summary

. In view of the importance of taking load-versus-compression characteristics on gelatins and other textile auxiliaries, a precision instrument has been developed with which it is possible to make such tests with an accuracy of four significant figures.

The instrument described permits the quantitative determination of load-versus-compression characteristics during loading as well as unloading, the investigation of the time factor, of elastic hysteresis, and fatigue, phenomena, as well as the jell strength within gelatins, sizes and the like.

Introduction

AMONG the auxiliaries used in the textile industry, gelatins and related products are becoming of increasing importance. This is due to the fact that they are particularly adaptable to synthetic fibres, of viscose as well as acetate type, the use of which is steadily increasing according to the statistical data available. Accordingly the consumption of gelatins and related materials that are necessary for their processing, is increasing. Unfortunately, increased consumption of these materials combined with decreased production has produced a seller's market.

Under such conditions, and in view of the highly competitive situation of the textile industry, it is of the utmost importance to evaluate gelatin in a clear and objective manner as to its value for specific textile operations. It is attempted in this paper to introduce engineering data that permit not only the reproduction of the qualities wanted as per purchasing specifications, but that also are capable of showing objectively the actual product value of gelatins and similar auxiliaries.

An apparatus has been developed, which is described in the following pages, with which it is possible to determine the typical physical characteristics according to which an objective evaluation of the different types of gelatins is now possible.

While the principle of load-versus-compression characteristics during the loading as well as unloading cycle was developed previously by the writer,[3] an entirely different instrument with greatly improved simplicity of operation and precision of measurement has now been perfected. Its opera-

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tion is described under the subsequent heading "The Technique of Measurement."

Preparation of the Test Specimen

For measuring gelatins, the sample is prepared in accordance with the specifications[1] of the Glue and Gelatin Manufacturers' Association. These are (with some minor modifications for practical use) as follows:

Container for the Jelly.—The container recommended is an extra wide mouthed bottle of the following specifications:

Capacity		150 cc.
Diameter of body:	Inside	59 mm.
	Outside	66 mm.
Height over all		85 mm.
To take rubber stopper No. 9		

Bottles showing a variation of more than 1 mm. in average internal diameter from these dimensions shall be rejected. The tapered stopper is cut in half and the upper portion is perforated by plunging a red-hot, ¼-inch (.25 cm.) rod through it at the center. The upper half of the stopper is used to obtain a snug fit in the neck of the bottle and the air vent prevents the stopper from being blown out during the melting and heating of the sample. It is not necessary to emphasize that the containers and stoppers must be clean and dry.

Not mentioned in the original standard methods is a tool, developed by Dr. Miner D. Given, which can be used to cut the rubber stopper in half. The procedure is described as follows: The rubber stopper, A (Fig. 1), is

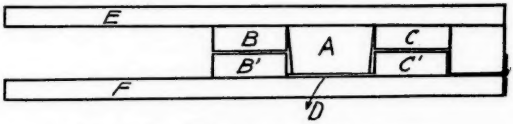

FIG. 1. Device for cutting rubber stopper.

inserted between two holding bars, B and C, and depressed by a bar, D, with the aid of the pliers, E and F. The rubber stopper, held rigid in this manner, is now cut easily and straight with a knife that has been wet with caustic soda. Instead of making a one-inch hole, it is sufficient to heat a small wire rod or knitting needle and plunge it red-hot through the center of the stopper. This provides for a small air vent and facilitates the heating and lifting of the stopper after heating of the sample. At the same time, this smaller hole is a better protection against impurities contaminating the surface of the gelatin, and guards against undue evaporation of the water in the sample while heating. Moreover, this smaller hole can be covered easily with the finger and the liquid, hot gelatin, tilted until there are no air bubbles on top of the gelatin.

Violent agitation of the hot solution is to be avoided because, (1) it causes damage in the viscosity; (2) in some cases persistent foams are formed which may interfere with the subsequent jell test. It is important that the plunger rests upon a clean gelatin surface, not upon jelled and frozen foam.

Sampling

Ground Glue or Equivalent.—A grab sample in the ratio of 1 ounce per 100 pounds (28 grams per 45 kg.) shall be taken at random from not less than 20% of the containers, except that the total number of samples so taken shall not be less than 10. When the number of containers in the shipment is less than 10, samples shall be taken from each container.

Sheet, Flake Glue, etc.—Sample shall be taken as outlined for ground glue, except in cases of large lots, where the entire sample drawn will amount to more than 10 pounds (4.5 kg.), in which cases the portion taken from each container shall then be reduced proportionately so that the total sample drawn shall not exceed 10 pounds (4.5 kg.).

Grinding of Sheet, Flake Glue, etc.—The entire sample as drawn above shall then be ground in any suitable manner, to at least 4 mesh, or finer if in the judgment of the operator it appears necessary, so as to minimize weighing errors and to shorten the soaking period.

Sampling for Test.—The entire ground sample as drawn and prepared above is then thoroughly mixed and watered down until reduced to two 1-pound (454-gram) samples, which shall be placed in air-tight containers. One of these is to be used for test and the other shall be held as a reserve sample.

Concentration

The following concentrations are to be used: For 105 cubic cm. of distilled water there shall be used 7½ grams of gelatin. In other words, the concentration is 1: 14. This is called the gelatin scale. For glues, which have a lower gel strength, 15 grams of glue shall be dissolved in 105 cubic cm. of water. This is called the glue scale, or a concentration of 1: 7. Automatic pipettes with a three-way stop cock may be used to deliver the 105 cc. H_2O correctly in routine work.

The dissolved sample in the tightly stoppered container is allowed to cool to 45° C., preferably in a water bath maintained approximately at this temperature. The finger is then placed over the perforation in the stopper and the container inverted several times to mix in the water that has condensed on the walls of the bottle and the under side of the stopper. One after the other of the containers, or small groups, is then placed in a constant temperature chill bath for not less than 16 nor more than 18 hours at 10° ± 0.1° C. (Not too many samples shall be inserted in order to maintain the temperature capacity of the equipment.)

Attention should be given to the importance of the temperature variation of the chill bath and reasonable agitation of the chill bath. Unless the bath controls the temperature within the limits prescribed above, it will be necessary to use "standards" and thus make relative and not absolute tests. Thermostatic recording and regulating equipment may be used.

The Technique of Measurement

After the sample has been made in accordance with the specifications, a beaker of cold water, which has as near as possible a temperature of 10° C., is placed upon the pan of the balance (Fig. 2). (Cold water may be taken from the chill bath.) The plunger with the hard rubber tip is inserted into the chill bath and left there for 2 minutes. In this manner the temperature of the testing instrument will be reasonably close to the temperature of the specimen to be tested.

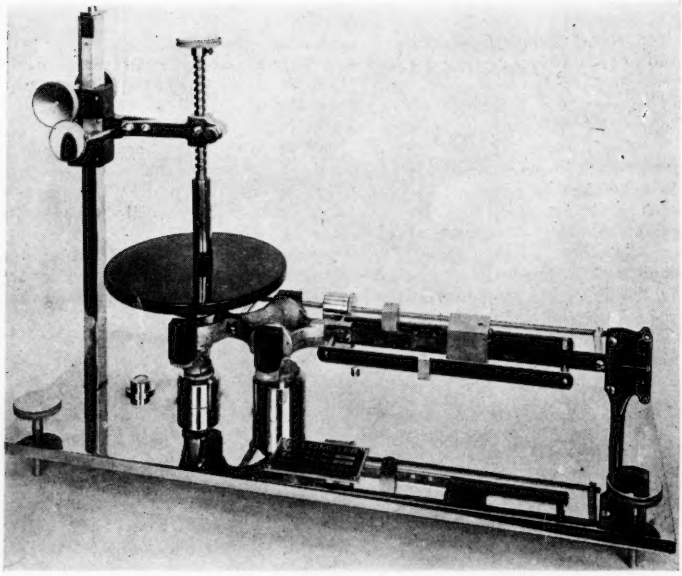

FIG. 2. The Gelometer.

The tip of the plunger has been made purposely of hard rubber in order to reduce the thermal conductivity. After this tip has been chilled, for a period of 2 minutes, it has been found that for all practical intents and purposes, and if the samples are brought in reasonably fast, the temperature of the plunger surface is the same as that of the sample to be tested.

Before lowering the plunger, a sample contained in the water bath is calibrated by the tare weight (the metal cylinder running upon a screw in back of the scale). In this manner the sample plus water bath can be calibrated, with the scale pointing at zero and all weights in zero position. In other words, readings taken will be direct load versus penetration readings, and no subtraction has to be made for the tare.

The plunger is dried now with a towel. Also, in between samples, the plunger is cleaned. The arm on the rack and pinion drive is lifted so that the reading on the vernier scale is exactly zero.

At this zero position of the vernier, which can be ascertained through the reading glass attached to the rack and pinion drive, the plunger is lowered with the acme screw only (at the right side of the arm). By turning the knob on top of the screw, the plunger with the hard rubber tip can be lifted or lowered until it just touches the surface of the test sample in the bottle. This can be ascertained with great precision by watching the pointer at the right side of the scale. This shows in about 4 times enlargement the motion of the pan and thus it can be ascertained directly

whether the plunger just touches the surface of the sample or impresses the scale.

After the sample has been brought in position as described above, the acme screw is clamped tightly with a clamp in front of its bearing. It does not turn any longer and all the motion applied to the plunger must now come from the rack and pinion drive.

The rack and pinion drive is now lowered until the vernier reads exactly 0.40 cm. Because the plunger depresses the sample, the hand at the right side of the scale points upward. The weights are moved to the right side now until the pointer indicates zero again. The weight in grams necessary to bring the pointer back to zero if the standard plunger is depressed 4 mm. into the gelatin sample prepared as per the above standard concentrations is called the Bloom number.

It will be noted that this standard depression into the test sample can be read with the *precision of 4 significant figures.* It will be readily understood that the maintenance of this constant depth, therefore, is a more precise one than a gap with contact points that may arc under the influence of electric current and burn out, such as used for determining the depth in some apparatus. The weight can be read to $\frac{1}{10}$ gram. The new Gelometer, furthermore, uses no electric batteries, and it is immaterial whether the shot is clean and dry.

Load-Versus-Compression Characteristics

In addition to the factors mentioned, which increase the precision and reliability of the instrument, it has a place of its own in view of the fact that several more important characteristics can be determined readily with the new Gelometer which cannot be ascertained in a practical manner with previous constructions. A description of some of these measurements has been made previously.[2] Substantially, they are characterised by the following:

In view of the fact that the elastic recovery in the wet state and in the dry state stays in a definite relation, measurements of *elastic recovery, plastic deformation* and *elastic hysteresis* are of considerable scientific and industrial importance.

Elastic Hysteresis

It will be understood that weight cannot only be applied with the new Gelometer, but it is equally simple to reduce the amount of weight after load application has taken place. Then, by lifting the plunger point by point, *the elastic recovery of the material can be measured* toward its zero position. Some plastic deformation does take place; the total amount of plastic deformation is different for different materials and not necessarily proportionate to gel strength.

In other words, in determining only the penetration for 4 mm., we have no means whatsoever of predicting from this whether the jellying substance will recover elastically or whether it will remain plastically deformed to a larger extent. Fig. 3 shows a hysteresis loop which has been arrived at by first increasing the weight and measuring the penetration which brought the balance back to zero, and thereafter decreasing the weight again. *The area of this loop is proportional to the internal distributed energy that counteracts a recovery of the sample to zero position.*

As can be seen, a permanent deformation of 0.03 cm. has been effected. Moreover, it will be understood that the difference between load applied

and load removed per unit of penetration is small at the beginning and increases thereafter. At 3.2 mm. depression a load difference of 20 grams exists between the ascending and the descending branch of the characteristic. At a depression of 0.60 cm., however, this weight difference has increased to 30 grams, which difference is practically maintained until zero load.

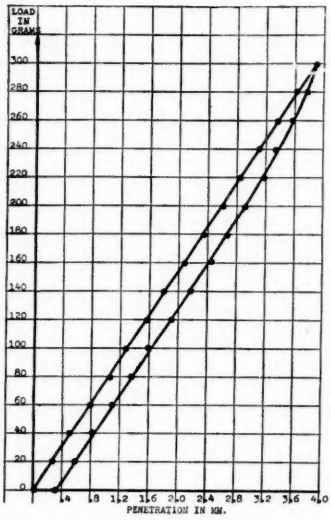

FIG. 3. Elastic hysteresis in the gelatin sample.

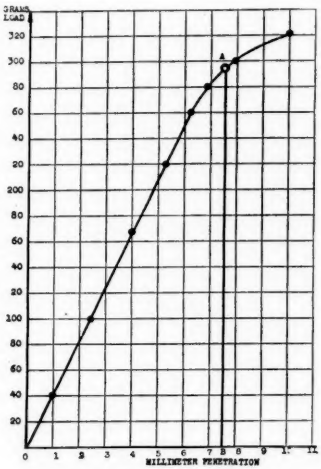

FIG. 5. The work factor.

Elastic Recovery

Instead of taking complete hysteresis curves, it is possible for certain simplified measurements merely to determine the elastic recovery which a gelatin is capable of sustaining after a certain load has been applied during a given time. In many instances this simplified measurement will give first hand information about the forces of elastic recovery without going into complete hysteresis measurements that consume a longer time.

Care should be taken in making measurements for the determination of comparative elastic recovery to work with the same total amount of time in all instances. If that is not done, it will be found that the time factor influences the readings. In other words, a deformation as well as recovery is not instantaneous. A small load applied over a considerable length of time introduces plastic flow. It may produce more permanent deformation than a comparatively larger load applied for a rather short time. Questions of rheological nature (such as plastic flow) enter here.

The technique for making such determinations is to make the standard specimen and calibrate it with the tare weight upon the scale. Then the plunger is lowered until it touches the surface of the gelatin. Hereafter, a given weight, say for instance of 100 grams, is applied and the plunger

lowered with the rack and pinion drive until the pointer at the right hand of the scale indicates zero again. The depression is now read on the vernier. This weight is applied for one minute. Thereafter, the weight on the balance is returned to zero and the plunger lifted on the rack and pinion drive until the hand of the scale points to zero again. Under these conditions the plunger will *not* return to zero, but a certain amount of impression will have remained permanent. It is read directly on the vernier.

It will be understood that the recovery of a gelatin sized yarn to its original length after having been stretched, will be more complete the better the recovery is of gelatin test specimens after removal of the load.

Yield Point

The yield point, P (Fig. 4), appears at this point of the load-versus-penetration curve where, without further addition of load, the plunger continues to penetrate into the material. At this point of the load-versus-penetration characteristic, the elastic limit has been passed. It seems that the yield point and subsequent slope of the load-penetration characteristics is influenced by the mixture of components ordinarily called gelatins.

It is now interesting to note that *the elastic limit is not necessarily influenced by the Bloom number of the gelatin.* Everything else being equal, the yield point at a comparatively low stiffness number may lie higher. In other words, the maximum stress to which such a jelly may be subjected and still recover completely is not necessarily dependent upon the Bloom number. Fig. 4 will make this clear. In this instance Curve B has a higher Bloom number, as shown by a load of 142 grams at 4 mm. penetration (Point A). Yet, the maximum load which this material can sustain lies at 190 grams (Point P).

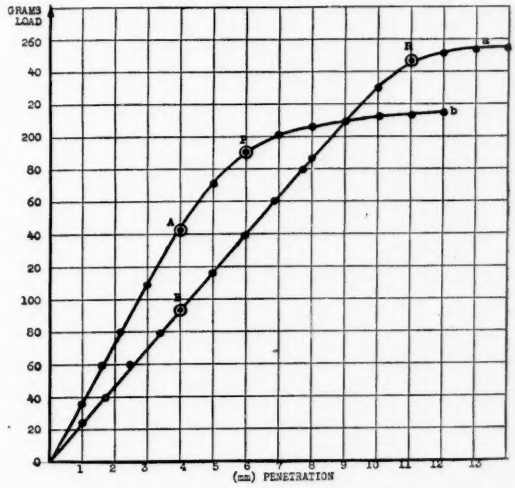

FIG. 4. The yield point is not necessarily indicated by the Bloom number.

On the other hand, the comparatively softer material represented by Curve A, the Bloom number of which is 46 grams lower (Point B), yields at a substantially higher load, namely at 246 grams (Point R). While characteristic C will give suitable data for gelatins, the desirable characteristic of which is stiffness only, Curve A will be preferable for such jellies, the desirable characteristic of which is resistance against final deformation. It seems that a certain amount of elastic give is possible which can raise the yield point substantially.

For this and other reasons, it is imperative that means for evaluating the physical characteristics of jellies shall have a range wide enough to continue with the measurements until the final break. For this purpose facilities for penetration *in excess* of the 4 mm. to which the standard test is limited must be used as the yield as a rule occurs at a higher penetration than 4 mm. In view of this fact, care has been taken in the apparatus developed to provide for ample transport of the standard plunger and for sufficient total weight in order that the experiments may be continued as far as the yield point and beyond.

The Gel Factor

The importance of a higher expression for gel strength was first suggested by Sheppard in terms of the torsional elasticity of the gel.[5] As seen previously, the slope of the load-versus-penetration characteristic alone, such as indicated by one point on this slope, namely the Bloom figure, is not indicative alone of the gel strength of gelatin. What is indicative, however, for gel strength is the *total work necessary before the final break in the jelly occurs.*

It is proper, therefore, to determine this Gel Factor in terms of the area of the triangle included between the load-versus-penetration curve and the abscissa. This total area OAB, as can be seen from Fig. 5, is then:

$$A = \tfrac{1}{2} \text{ the breaking load} \times \text{penetration (gram cm.)}$$

In our specific instance the Gel Factor J would equal:

$$J = \tfrac{1}{2} \times 294 \times 0.75 = 110.6 \text{ (gram cm.)}$$

This result, multiplied by a numerical constant C, can be compared with the expression for Proof Resiliency, as suggested by Sheppard[4] in terms of the torsional elasticity of a standard jelly cast.

The term "gel factor" was suggested by the writer[3] in 1935 in order to avoid confusion with the term "jelly strength," which in common use today is assumed to be proportionate to the Bloom number only and therefore does not describe those characteristics of gelatin that are of importance to the textile industry.

For industrial control tests, as well as for research work, it has been found to be more accurate to determine the value of gelatin in terms of gel factor. It will be readily understood that it is entirely possible to have a high gel factor despite a low Bloom number and vice versa. What seems to be most characteristic for gelatin is the amount of total work necessary before the final break in the jelly occurs, and not the amount of load to produce one haphazardly taken penetration depth. Tests shall represent these conditions that are actually of primary importance for the product, and not necessarily certain points that are convenient to use for a limited number of producers.

Among the factors that are of the greatest importance for the consumer of gelatins, the price relations of gelatins in regard to the quality of the

respective sizes are of primary interest. Ordinarily, one would assume the gelatins to be the better for textile purposes the higher their price. This is not the case as shown graphically in Fig. 6.

Gelatins of various manufacturers were compared as to their load-versus-penetration characteristic, stiffness, and jell strength. These qualities are improving the steeper the slope of the characteristic. In other words, the more inferior quality is produced by manufacturer A, while the best type is produced by manufacturer D. In between is the intermediate quality manufactured by B and C. It is now very interesting to note that the price is not necessarily indicative for the quality of the gelatin. While D, priced at 34c per pound, obviously is better than A priced at 19c, a different condition exists with B and C.

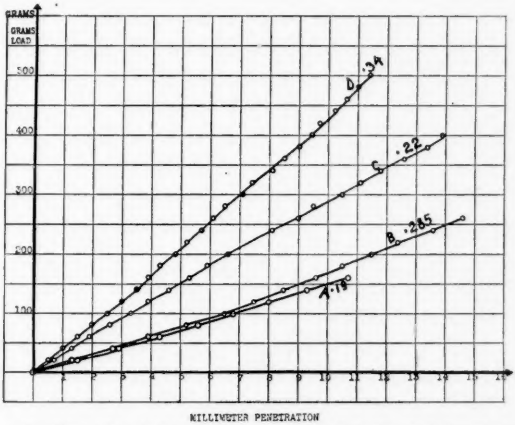

FIG. 6. Quality of gelatins is not necessarily indicated by their price.

There is no question that C is substantially better than B, yet C is priced at only 22c while the inferior B costs 28½c. In actual practice the condition is even more pronounced, because then we have not only to pay more on a per pound basis for the product B and C, but in addition a higher percentage of B in solution is necessary to achieve the same effects that are given by C. All these figures have been taken from actual samples studied in the practice of the writer. The exact relation is that 25% more in material of gelatin B is necessary to achieve the same results arrived at with the unit weight of material C. In other words we have to add to the unit price of 28½c, 25% of the above sum which means:

$$\$0.285 + \$0.075 = \$0.360.$$

In other words the true comparison is not of a 22c gelatin against a 28½c gelatin, but the actual comparison on a pound per pound basis. This would bring us to comparing 28½c against 36c. This difference is:

$$\$0.36 - \$0.22 = \$0.14$$

or **64% savings in the total expenditure of gelatin,** which in this instance was used for the purpose of sizing and throwing.

Conclusions

In the foregoing a new method has been described, with which it is possible to determine certain physical characteristics of gels and jellies in terms of load-versus-penetration characteristics with a precision of 4 significant figures.

The instrument described makes it possible not only to check the Bloom figure, but in addition to make the following determinations:

1. Yield point
2. Elastic hysteresis
3. Elastic recovery
4. Gel factor
5. Fatigue

The physical characteristics described make possible the evaluation of gelatins, glues, and sizes in terms that are significant for the use of these materials in the textile industry.

The Gelometer described in this article has a substantial number of applications in addition to the measuring of gelatins and other sizing materials. Among the products that can be tested with the instrument are fabrics, felts, staple fibre, and others.

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(*Continued from P. 4.*)

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John Bancroft, Jr., J. E. Edgerton, Philip A. Johnson, Charles B. Nichols, Robert E. Rose, H. V. R. Scheel, Harold DeW. Smith, P. J. Wood.

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Abstracts

Committee on Abstracts and Bibliography:
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Address, C. H. Clark, Sec., 65 Franklin St., Boston, Mass.

I. Fibres (Synthetic and Natural) and Fibre Analysis

Adsorption of Metallic Ions by Cellulose: Isoelectric Point of Cellulose. Juliette Gavoret. *Compt. rend.*, 1937, V. 204, P. 1643–5; cf. *C. A.*, V. 26, P. 6120; abs. in *C. A.*, 1937, V. 31, Col. 5571.

The adsorption of Pb^+ and Cl^- by cellulose(surgical cotton wool) from dil. solns. of $PbCl_2$ (0.005–0.04 g./l.) buffered to pH 1.2–5.4 was detd.; under no circumstance was any Cl^- adsorbed, and no Pb^+ with pH less than 2.7; with higher pH adsorption rapidly increases for all conens. and also with conen. Similar results were obtained with other forms of cellulose. They imply that the isoelec. point of cellulose is slightly below pH 2.7 (cf. Edge, *C. A.*, V. 23, P. 4569). (W)

Carbonization of Wool. W. Pflumm. *Monatschr. Textil-Ind.*, 1937, V. 52, P. 165–6; abs. in *C. A.*, 1937, V. 31, Col. 6011.

A review of the carbonization process. Various hazards are discussed. (W)

Degumming of Flax and Hemp: Theory and Illustration of. F. Tobler. *Faserforschung*, 1937, V. 12, P. 178–86; abs. in *C. A.*, 1937, V. 31, Col. 6015. (W)

Cottonins and Their Uses. O. Schmidhäuser. *Klepzig's Textil-Z.*, 1937, V. 40, P. 124–31 (through *C. A.*, 1937, V. 31, Col. 2828); abs. in *J. T. I.*, July 1937, P. A355.

Cottonization of flax consists of the complete separation of bast fibre bundles and depends upon the solution of the cementing material between

the single cells. Cottonin fibre is similar to cotton in length and fineness but lacks the springy and elastic property of cotton. The cementing material between the cell walls, consisting of pectin compounds, plant wax and lignin, is removed by treatment with alkalies (NaOH or soda) followed by slight acid chlorination for the complete removal of woody constituents. To prevent a very slight residue of the cement from remaining and forming new bundles during drying, it is necessary to complete the chemical treatment by very thorough washing. Various factors are discussed which are important for spinning operations, staple curves and pictures are shown and data are given for the dry and wet strengths of cottonin-cotton, cottonin-rayon and cottonin-cotton-rayon yarns. (C)

FIBRE STRUCTURE: SOME ASPECTS OF. S. M. Neale. *Silk J. Rayon World*, 1937, V. 13, No. 155, P. 53–4; abs. in *C. A.*, 1937, V. 31, Col. 5583.

The relation of the main characteristics of fibres to their mol. structure is discussed; such operations as water absorption, dyeing, swelling agents, spinning stretch and the possibility of increasing the strength and durability of rayons are taken into account. The strength of rayons decreases considerably on being wetted because the mutual lateral cohesion between overlapping mol. chains in being sepd. is lessened. The orientation of the mol. chains in rayon is almost entirely dependent on the spinning stretch. Viscosity and chain length seem to be interdependent. Present mfg. processes preclude the maintenance of the long chain mol. structure of the natural cellulose intact, with the resulting improvement of strength. Silk and wool fibres are of the amino acid protein type in zigzagged chain form, while the starch and cellulose fibres are of the glucose chain form. (W)

FIBRE STRUCTURE AND DEGUMMING OF FLAX. Kurt Schneider. *Faserforschung*, 1937, V. 12, P. 169–78; abs. in *C. A.*, 1937, V. 31, Col. 6014. (W)

FLAX STALK: NEW OBSERVATIONS ON THE COURSE OF AND VARIATIONS IN RETTING OF THE. Harald Fried. *Faserforschung*, 1937, V. 12, P. 197–222; abs. in *C. A.*, 1937, V. 31, Col. 6014. (W)

STRUCTURE AND ELASTIC PROPERTIES OF SILK FIBROIN. PRELIMINARY REPORT. I. Sakurada and Y. Matsushita. *J. Soc. Chem. Ind.*, Japan, 1937, V. 40, Suppl. binding P. 58–9; abs. in *C. A.*, 1937, V. 31, Col. 6012.

TEXTILE-FIBRE SCIENCE. W. Schramek. *Kolloid-Z.*, 1936, V. 77, P. 210–13; abs. in *C. A.*, 1937, V. 31, Col 6009.

A general review. (W)

RAMIE: A CRITICAL SURVEY OF FACTS CONCERNING THE FIBRE BEARING PLANT "URTICA NIVEA." G. L. Carter and P. M. Horton. *La. State Univ. Studies*, 1936, No. 26, pp. 111 (through *Exper. Sta. Rec.*, 1937, V. 76, P. 472); abs. in *J. T. I.*, July 1937, P. A357. (C)

WHOLE COTTON PROJECT. A. R. Macormac. *Am. Dye. Rptr.*, July 12, 1937, P. 389–96.

A paper presented at meeting of Piedmont Section of A. A. T. C. C., April 17, 1937. Described progress in utilization of whole cotton plant as a source of cellulose. (C)

WOOL: EFFECT OF MOISTURE AND HEAT ON. M. Loescher. *Deut. Textilwirtschaft*, 1937, V. 4, No. 3, P. 24–6; abs. in *C. A.*, 1937, V. 31, Col. 6012.

The penetration of moisture through the cuticular layer of wool fibre increases with temp. and with increased acidity or alky. The cuticular layer softens slightly and yields to the more greatly affected inner parts after they have swollen upon coming in contact with the liquid. The thickness of the woolen fibre may thus be increased 17.5%; the swelling is caused by a slight hydrolysis. The same swelling action can be produced by treatment with Cl which combines with the amino acids. During the washing of textiles of worsted yarns at moderate temps. and in the absence of tension or pressure the fibres are only slightly affected. Changes will occur if stresses are present; they are more noticeable with carded-yarn than with worsted-yarn fabrics. Carded-yarn fabrics can be prevented from shrinkage by fixation on a madder machine with hot water and steam. The process is discussed in detail. The change of α-keratin to β-keratin and the reversal of this change are important factors in the behavior of wool in the processes of finishing and dyeing. These reactions occur at an increased rate during acid felting. Treatment of wool with hot baths and acid results in the soln. of a small amt. of the protein; thus the bath is enriched with constituents which are helpful during the later treatment of the wool. (W)

II. YARNS AND FABRICS

BACTERIA: PROTECTION OF TEXTILE FIBRES BY DESTRUCTION OF. A. Foulon. *Deut. Wollen-Gewerbe*, 1937, V. 69, P. 683–4; abs. in *C. A.*, 1937, V. 31, Col. 5537.

There is no great difference in the resistance of cotton and linen goods against bacterial attack although cotton fabrics have a greater tendency to mold formation. Weft yarns are more easily affected than are warp yarns. Black mold (*Tilletia auranticum*) is the most common variety of mold, grows rapidly and can be removed easily. Red molds occur less often, have a shorter life period and disappear by themselves. Mildew forms frequently because of the extensive distribution of its spores in air and water. The destructive action of these microorganisms can be overcome by means of a new textile aid, "Rasehit" (*R*) (6-chloro-3-hydroxy-1-methylbenzene). The compd. is water-sol. and practically neutral; hence it does not alter the pH of the textile aid soln. which is of importance. *R* also prevents the decompn. of oils and emulsions used for textile treatments and is applied for such purposes by addn. of a soln. of 1 kg. *R* in 3 l. alc. to 500 kg. of the oil or else by direct addn. to the oil which had been heated to 70°. The use of *R* in the much more easily decompd. emulsions employed in the textile industry has the advantage of stabilizing these sizes for several weeks. Various operations are reviewed. (W)

BRANDWOOD VACUUM STEAMER. Jos. Brandwood. *Silk and Rayon*, 1937, V. 11, P. 70–2; abs. in *C. A.*, 1937, V. 31, Col. 5171.

An app. is described for setting of twist in crêpe and other highly twisted yarns. (W)

CELLOPHANE RIBBONS: USE OF—IN MANUFACTURE OF TEXTILES AND CLOTHING. O. Pennenkamp. *Deut. Textilwirtschaft*, 1937, V. 4, No. 1, P. 28–30; abs. in *C. A.*, 1936, V. 31, Col. 4329; 1937, V. 31, Col. 5586. (W)

CLEANING CLOTH USED IN INDUSTRY: ECONOMICAL CLEANING OF. A. Foulon. *Deut. Wollen-Gewerbe,* 1937, V. 69, P. 779–80; abs. in *C. A.,* 1937, V. 31, Col. 6017.

Cleaning cloth is most economically cleaned by the use of powd. water glass. Such a cleaner is designated in Germany as "P3." To test the effect of P3 on the tear resistance of cotton and linen cloth samples of these textiles were washed 25 or 50 times with solns. of P3 of various concns., and the decrease in the tear resistance was detd. The decreases in tear resistance were for cotton with 2.5 and 5% P3 solns.: after 25 washings none, after 50 washings 1.1 and 7.1%; for linen with 1% P3 soln.: after 25 washings none, after 50 washings 12.1%. Directions are given for the proper washing with P3. A 0.75–1% soln. is recommended. (W)

COATING WITH ACETATE. John H. Lepperhoff. *Tex. Wld.,* July 1937, P. 76–7.

Provides variety of protective and decorative finishes on wide and narrow fabrics. (C)

COTTON FABRICS FOR BITUMINOUS-SURFACED ROADS. R. J. Cheatham and Rodney Whitaker. *Tex. Bull.,* Aug. 12, 1937, P. 3–6.

Describes requirements and fabric specifications. (C)

COTTON UTILIZATION AND NEW INDUSTRIAL USES. R. J. Cheatham. *Tex. Bull.,* Aug. 5, 1937, P. 5–7, 11, 22. (C)

EXPERIMENTS WITH TYLOSE (ON TEXTILE FABRICS). W. Haussner. *Klepzig's Textil-Z.,* 1937, V. 41, P. 242; abs. in *C. A.,* 1937, V. 31.

Tylose is a synthetic cellulose ether which is used for various industrial purposes as a binding, emulsifying, thickening, filling, refining and sizing agent. Tylose TWA 25 is manufd. in the form of yellowish white cotton-like flakes, is chemically neutral, resistant to residual acid and alkalies adhering to textile goods and is not attacked by the Cu present in the various utensils used for textile purposes. The soln. is prepd. by treating the flakes with 9 times the amt. of 70–80° water, cooling to 20° when complete soln. takes place, and addn. of the required vol. of water with appropriate stirring. In order to test the usefulness of this product a 1½% bath was applied to cotton shirt cloth, woolen coat cloth, spun rayon carded yarn and net goods. In every case the feel of the goods was greatly improved. However, with the wool and the carded yarn numerous small fibre particles appeared on the surface which was thought to be due to incomplete soln. of the Tylose. It was believed possible to eliminate this defect by more exhaustive studies of soly. conditions. Tylose TWA 25 is also well adapted for the sizing of warps in place of potato starch. It has the advantage over glue and potato starch in avoiding any glueing together of the warps as well as the irksome formation of incrustation. Another com. grade is Tylose 4 S which is used in finishing operations to give a high luster to textile goods, thus largely eliminating the need for a mercerization. Other textile uses of Tylose are described. (W)

FIBRE RIGIDITY IN FINISHING. *Fibre & Fabric,* Aug. 21, 1937, P. 13–14.

Reprint from *Textile Mercury and Argus.* Discusses processes which decrease or increase elasticity of fibres and their products, and variations in resultant finished effect or strength. (C)

GRADING, UTILIZATION AND PROPERTIES REQUIRED OF WOVEN FELT AND INDUSTRIALLY USED CLOTH. A. Litschgi. *Deut. Textilwirtschaft*, 1937, V. 4, No. 2, P. 14–23; abs. in *C. A.*, 1937, V. 31, Col. 5586.

A survey. Several samples of cloth are shown as well as devices used for testing and mfg. purposes. (W)

HEATED DRYING CYLINDER: CALCULATIONS. R. v. Weores. *Textil Lloyd*, 1937, V. 11, No. 5, P. 25–29; No. 8, P. 22–25; abs. in *J. T. I.*, July 1937, P. A377.

Calculations of the pressure exerted by the squeezing rollers on the fabric, the amount of water taken up by the fabric and the amount remaining after passing between the squeezing rollers, the heat requirements of the heated drying cylinder, and the costs of steam heating and electric heating are explained. The construction of an electrically heated cylinder is described and it is pointed out that electrical heating is not dear compared with steam heating. (C)

LACQUERED DESIGNS ON TEXTILES. M. A. Dorian. *Rayon Tex. Mo.*, Aug. 1937, P. 58. (C)

LAUNDERING: REACTIONS OF THREE ALL-WOOL BLANKET FABRICS TO THREE TYPES OF. Ruth E. Elmquist and Margaret B. Hayes. *Am. Dye. Rptr.*, Aug. 9, 1937, P. 469–76.

In general, both repeated laundering and service plus washing caused a decrease in strength-index, air permeability, sulfur, nitrogen, and resistance to bacterial attack, and an increase in weight per square yard, thickness, thread count, moisture, ash, methylene blue absorption and scale breakage. Laundry Process A using the cotton rib-washer was more damaging than Process C with the Y-pocket machine and the latter more than the squeeze-roll Process B. Every physical and every chemical test for measuring deterioration showed that wear plus laundering caused more damage than merely repeated laundering. Shrinkage was found to be dependent on the fineness of the wool as well as on the laundry procedure. (C)

MILDEWPROOFING KHAKI AND OTHER MINERAL DYED COTTON DUCK WITH COPPER COMPOUNDS. T. D. Jarrell, L. S. Stuart and H. P. Holman. *Am. Dye. Rptr.*, Aug. 23, 1937, P. 495–500, 519–23.

Contribution from Bureau of Chemistry and Soils of the U. S. D. A. The results of experimental work indicate that the precipitation of insoluble copper compounds upon cotton duck by means of sodium carbonate, the inclusion of copper compound with other metal compound or compounds in mineral dyeing cotton duck, and the addition of basic copper carbonate to a waterproofing solution, are effective means for mildewproofing cotton duck which is to be exposed to the weather, provided sufficient copper is used to have at least 0.11% of copper in combined form on the fabric at all times. Since basic copper carbonate and other copper compounds precipitated from solutions by means of sodium carbonate are gradually removed from fabrics by atmospheric agencies, a substantial quantity of copper must be used. For duck to remain mildewproof after six months of continuous exposure, at least 1.7% of copper in combined form should be precipitated on the fabric when copper solution alone is used for impreg-

nation. In mineral dyeing with chromium, iron and copper compounds, somewhat less copper is required, the original quantity needed to keep the duck mildewproof for six months being approximately 1.4%. (C)

MOLECULAR DAMAGE (IN CRABBING) AND ITS IMPORTANCE. G. L. Atkinson. *Am. Dye. Rptr.*, Aug. 9, 1937, P. 478, 488–89.

A fabric which has been properly crabbed will, upon being correctly dewed or damped in finishing, heat up within a few hours and there is considerable regain in the moisture content of the fabric cells (the cloth being heavier) and both finish and handle are improved. If molecular damage has been sustained in initial preparing this will not take place and is a satisfactory test. (C)

RAYON CRÊPE. *Canadian Tex. J.*, Sept. 3, 1937, P. 37–8, 50.

Physics and mechanics of crêpage and factors influencing final appearance of cloth. Abstract of an article in *Research Illustrated* published by E. F. Houghton & Co. (C)

RAYON FOR WARMTH—OR WOOL. *Am. W. & C. Rptr.*, Aug. 5, 1937, P. 14, 38.

Leading factors discuss equality of warmth of rayon as compared with wool. U. S. Bureau of Standards compares insulating qualities. (C)

RAYON SIZING AND CRÊPING. XI. DRYING. G. E. Wilson. *Silk and Rayon*, 1937, V. 11, P. 48, 53, 61. XII. *Ibid.*, P. 226–29. XIII. *Ibid.*, P. 328, 330; abs. in *C. A.*, 1937, V. 31, Col. 5170.

Organization of the sizing department is discussed; conditioning and winding processes are described (cf. *C. A.*, V. 31, Col. 1625). (W)

REACTIVITY OF SULPHUR LINKAGE IN ANIMAL FIBRES. IV. J. B. Speakman and J. L. Stoves. *J. Soc. Dyers Col.*, June 1937, P. 236–42.

In previous papers, the permanent set acquired by strained animal fibres in steam or boiling water has been attributed to the breakdown of salt and sulphur linkages between the peptide chains, followed by rebuilding of —S—NH— linkages. The latter were presumed to result from the interaction of the basic side-chains and the sulphenic acid formed by disulphide bond hydrolysis, but Phillips has suggested that the sulphenic acid may decompose to form an aldehyde, which may condense with basic side-chains to form —CH=N— linkages instead of —S—NH— bonds. Since the former linkages are hydrolyzed by hydrochloric acid, this suggestion has been examined by comparing the amounts of set retained by fibres set in various ways after (a) boiling in sodium bisulphite solution, and (b) boiling in *N*/10 hydrochloric acid, followed by boiling sodium bisulphite solution. No matter whether borax, sodium sulphite, or sodium metabisulphite was used as the setting agent, the number of linkages stable to boiling hydrochloric acid and sodium bisulphite solutions was so great as to leave no doubt that the main reaction taking place in setting processes is —S—NH— bond formation. Side reactions do, however, give rise to —CH=N— linkages when the setting agent is alkaline, the greatest number being formed when fibres are set at low extension in borax solution. (C)

SIZING: EFFECT OF—ON COTTON YARNS. *Tex. Wld.*, July 1937, P. 84.

Illustrated abstract of Effect of Sizing, Weaving and Abrasion on the Physical Properties of Cotton Yarn by Schreiber, Geibe and Moore, *B. S. J. Rsch.*, May 1937, P. 559–63; *Tex. Rsch.*, Aug. 1937, P. 391. (C)

SPINNING OF HAIR YARNS. R. Brosche. *Wollen u. Leinen Ind.*, 1937, V. 57, P. 76; abs. in *J. T. I.*, July 1937, P. A363. (C)

SPINNING MULE DRAW: MATHEMATICAL ANALYSIS OF THE. W. J. Guy. *Tex. Rec.*, 1937, May 6, P. 38–9; June 16, P. 41–2; July 6, P. 25, 38. (C)

SPINNING TESTS ON MIXTURES OF STAPLE FIBRES AND INDIAN COTTONS. Nazir Ahmad. *Tex. Mfr.*, June 1937, P. 217, 225.

In comparative spinning tests three types of staple fibre were found to give few yarn breakages, very even yarns, and high ballistic strengths, though lea and single-thread strength was lower. (C)

SPUN RAYON CONTRACTION. *Am. W. & C. Rptr.*, Aug. 19, 1937, P. 5–6.

Gives results of tests showing contraction of spun rayon as compared with filament yarn and cotton. (C)

SPUN RAYON: EFFECT OF WATER ON. *Am. W. & C. Rptr.*, Aug. 5, 1937, P. 5–6, 39.

Gives results of tests on wet and dry tensile strengths and percentages of elongation of staple fibre yarn, shearing and shrinkage capacity, and some comparisons with continuous filaments. (C)

SPUN RAYON: HOW TO OVERCOME CERTAIN "DIFFICULTIES" IN THE INDUSTRIAL UTILIZATION OF. Paul A. Koch. *Klepzig's Textil-Z.*, 1937, V. 40, P. 298–9; abs. in *C. A.*, 1937, V. 31, Col. 5170. (W)

SPUN RAYON: INFLUENCE OF—ON PROPERTIES OF MIXED FABRICS. Günter Kristin. *Deut. Textilwirtschaft*, 1937, V. 4, No. 12, P. 8–12.

Data obtained from phys.-strength tests of spun rayon, rayon, wool, cotton, mako and mixts. of wool-spun rayon and of cotton-spun rayon show that the careful incorporation of spun rayon in mixed fabrics improves the properties of the natural textile fibres. Exptl. data are tabulated, load-elongation curves of the fabrics examd. are shown and various photomicrographs are presented. (W)

STARCH, GLUE, VEGETABLE MUCILAGES AND OTHER MATERIALS FOR SIZING AND FINISHING (Textiles). Cellin. *Kunstdünger u. Leim*, 1936, V. 33, P. 329–33; abs. in *C. A.*, 1937, V. 31, Col. 5171.

A review emphasizing products made from raw materials of German origin. (W)

SYNTHETIC FIBRE WEAVING: MECHANICS OF. Albert Palmer. *Rayon Tex. Mo.*, 1937, June, P. 39–41; July, P. 33–4, 64; Aug., P. 31–3. (C)

TEXTILES GO CHEMICAL. Jos. F. X. Harold. *Ind. Eng. Chem.*, 1937, V. 29, P. 742–6; abs. in *C. A.*, 1937, V. 31, Col. 5583.

A review of the manuf. and treatment of textiles, with 44 references. (W)

WARP SIZING MACHINE: NEW HIGH-SPEED, MOIST-AIR-DRYING. Jos. Hibbert & Co., Ltd., Darwen. *Tex. Mfr.*, June 1937, P. 235–36, 253.

A new design of slasher-sizing headstock is capable of working at greatly increased outputs, and is applied with other new features in the Hibbert "Ideal" moist-air-drying machine. (C)

WOOL FABRICS: NOTE ON THE AGEING OF. W. T. Liu and J. B. Speakman. *J. T. I.*, July 1937, P. T207–T210.

The loss in strength which woolen fabrics undergo in scouring processes is slowly recovered during storage at ordinary temperatures and humidities. It seems probable that the recovery is due to the elasticity of the wool fibre, and is associated with the rearrangement of fibres which were disturbed by the mechanical action of the squeeze rollers of the rope scourer. The phenomenon gives point to the trade opinion that wool fabrics should be allowed a rest between successive finishing processes, and emphasizes the need for using untreated fabric of the same age and history as the treated, for reference purposes in experiments intended to determine the effect of various treatments on the properties of scoured fabrics. (C)

WOVEN SAMPLES: METHOD AND EQUIPMENT FOR MAKING SMALL. PART I. PREPARATION OF THE WARP. H. Boffey, R. McK. Kilgour and J. A. Matthew. *J. T. I.*, July 1937, P. T211–T223.

The equipment consists of three main parts, a special reel upon which the warp is wound and is drawn-in through heddles and reed at the same time, a small beam of special construction and stand for winding on the sheet of warp from the reel when the sample is to be woven in an ordinary loom, and a small loom of special construction for weaving the warp, if desired, as a continuous band after removal from the reel. The average operator should produce a sample cloth in about five hours.

PART II. WEAVING OF THE SAMPLE. *Ibid.*, P. T224–T236. Part I of this paper dealt with the description of a new type of reel and subsidiary mechanism for making a sample warp approximately ten feet long and one foot wide completely ready for weaving, that is to say, drawn-in through heddles and reed and dressed with a sizing mixture. It was stated that two methods of dealing with the warp after this preparation were available, one involving a special loom which weaves the yarn as a continuous circular band, the other being slightly modified standard practice on an ordinary loom. The alternative methods of weaving the sample are now described, the special loom being dealt with first. (C)

III. CHEMICAL AND OTHER PROCESSING (NOT OTHERWISE CLASSIFIED)

ABSORPTION OF ACID BY WOOL. "Consultant." *Tex. Rec.*, July 6, 1937, P. 45. (C)

ACID-DYEING PROCESS: NATURE OF. Arthur L. Smith and Milton Harris. *B. S. J. Rsch.*, July 1937, P. 81–7; *Am. Dye. Rptr.*, July 26, 1937, P. 416–18.

The dye-combining capacity of untreated wool has been determined for the typical acid dye, orange II, and shown to be equal to the acid-

combining capacity. Treatments with nitrous acid, hydrogen peroxide, sodium hypochlorate, and strong solutions of sulfuric acid decrease the basicity of the wool and correspondingly decrease the affinity for acid dyes. Chlorinated wool absorbs acid dyes at a greater initial rate than untreated wool, but at equilibrium the latter absorbs more dye. The resist to acid dyes produced in the sulfuric-acid-carbonizing process is caused by the conversion of basic amino groups to sulfamic-acid derivatives. The results of the investigation constitute further evidence in favor of the chemical theory of acid dyeing. (C)

ACID WOOL DYEING, ITS SCIENTIFIC BASIS AND CONCLUSIONS OF PRACTICAL SIGNIFICANCE. Carl-Heinz Fischer. *Deut. Textilwirtschaft*, 1937, V. 4, No. 3, P. 20–3; abs. in *C. A.*, 1937, V. 31, Col. 5585. (W)

ALIPHATIC ALCOHOL SULFONATES USED IN HOT BATHS. V. Pflumm. *Tiba*, 1937, V. 15, P. 239–43; abs. in *C. A.*, 1937, V. 31, Col. 6011.

A brief outline of their merits in degreasing, dyeing, bleaching, and stripping. (W)

ALKALINE EARTH SALTS: USE OF—IN THE FINISHING OF TEXTILES. A. Foulon. *Deut. Textilwirtschaft*, 1937, V. 4, No. 8, P. 33–5; abs. in *C. A.*, 1937, V. 31, Col. 6017.

The use of $BaCO_3$, $MgCl_2$, $BaSO_4$, $CaSO_4$ and $MgSO_4$ is reviewed. Several less important alk. earth salts are briefly mentioned. Sr salts are not used in the textile industry. (W)

BLEACHED COTTON GOODS: CAUSE OF YELLOWING. (1) E. Kornreich, (2) A. Schmidt, (3) E. Kornreich. *Textilber.*, 1937, V. 18, P. 304–6; abs. in *J. T. I.*, July 1937, P. A373.

(1) In reply to criticisms made by Schmidt in a previous paper, the author explains the action and advantages of additions of bicarbonate to hypochlorite bleaching liquors as suggested by Minajew. He also discusses the formation of chloramines by the protein substances in cotton, described the properties of these compounds, and states that they, rather than oxycellulose, are the cause of the yellowing of bleached goods. (2) In reply, Schmidt points out that the use of bicarbonate had been suggested by other workers before Minajew, and states that the protein materials in cotton are removed by the scouring process so that the yellowing of bleached goods cannot be attributed to the presence of chloramines. (3) Kornreich admits that the use of bicarbonate had been mentioned by other workers, but maintains that the correct method of application was first described by Minajew. He points out that protein substances are not completely removed in scouring processes, and discusses briefly the difficulty of removing chloramines. (C)

BLEACHING OF COTTON GOODS. POSSIBLE METHODS FOR IMPROVING THE EFFICIENCY OF HYPOCHLORITE-BLEACH LIQUORS. A. J. Hall. *Tex. Merc. & Argus*, 1937, V. 96, P. 456, 458; abs. in *C. A.*, 1937, V. 31, Col. 5171.

Evidence is presented which shows that the efficiency of Cl-bleach liquors can be improved by addn. of $NaHCO_3$. The bleach liquors are made even more effective by addn. of suitable wetting out agents, especially those

inert to Cl. Bleaching in acid soln. is more likely to produce high Cu nos. indicating damage to the cotton. *Ibid*, P. 481, 483. Data are given showing that whiteness increases with increasing pH. An alk. bleach liquor at pH 9.6 appeared to produce the best whiteness and caused the least reduction in tensile strength of the fibre. Addn. of $NaHCO_3$ can be beneficial but preliminary trials must be made to ascertain its suitability for the type of bleach liquor to be used. (W)

CELLULOSE ETHER FINISHING SOLUTIONS: APPLICATION. W. P. Cohoe. *Chem. & Ind.*, 1937, P. 381–87; abs. in *J. T. I.*, July 1937, P. A376.

A general account is given of the use of the alkali-soluble cellulose ethers due to Lilienfeld as agents for permanent finishes. As pure sizes, the ethers may be used in 3½–5 or 6–8% solutions. Ethers of suitable viscosity may be incorporated with fillers; a finish that withstands laundering may be obtained when the ether is mixed with four times its weight of china clay. Alternatively, the ethers may be worked up with soap into lathers or foams. The process may be applied before bleaching and dyeing as the "finish" withstands ordinary processing. The advantages of cellulose ether finishes (sometimes in contrast with starch) are discussed. The main claims are (1) the cloth appears smooth and lustrous and has a linen-like handle; (2) the finish is unaffected by laundering (for at least 30 times) and is restored when the wet fabric is dried; (3) the finish reduces shrinkage in laundering; (4) finished cloth does not easily soil, become "hairy" with wear, or yellow with age; (5) the finish increases the tensile strength and resistance to wear of the fabric. Results of tests are quoted in support of some of these claims. (C)

CELLULOSE: SURFACE AND DYEING PROPERTIES OF. E. Broda and H. Mark. *Österr. Chem.-Ztg.*, 1937, V. 40, P. 277–81; abs. in *C. A.*, 1937, V. 31, Col. 6010.

Based on X-ray study the surface formation of cellulose fibre is discussed. It is shown that the dyeing of cellulose is an adsorption, while that of cellulose acetate a soln. process. Thirty-one references. (W)

CHEMICAL ENGINEERING IN THE TEXTILE INDUSTRY. Wm. A. Perry. *Am. Dye. Rptr.*, June 28, 1937, P. 353–56. (C)

CHLORINATION OF WOOL. "Technologist." *Tex. Merc. and Argus*, 1937, V. 96, P. 233, 235; abs. in *J. T. I.*, July 1937, P. A377.

After discussing the influence of chlorination on scale removal, felting and dye affinity, it is concluded that wet chlorination is of doubtful value and would not be practiced if there were an alternative method. Reference is made to the slippery handle of chlorinated wool in aqueous ammonia and to its scroop when dried. It is possible to produce an over-chlorinated wool material having a soft handle, but a harsh chlorinated wool has a large amount of scroop. (C)

COLLOID CHEMISTRY: WHAT THE DYER SHOULD KNOW ABOUT. E. Ullrich. *Wollen- & Leinen-Ind.*, 1937, V. 57, P. 17–18, 31–2, 73–4, 89–90; abs. in *C. A.*, 1937, V. 31, Col. 5585.

A lecture reviewing the properties of colloids and colloidal phenomena of interest to dyers. (W)

COLOR UNEVENNESS IN TEXTILE (SCREEN) PRINTING. "Technicus." *Tex. Rec.*, July 6, 1937, P. 41–2. (C)

COLORIMETRY: APPLICATIONS OF—IN THE DYEING AND ALLIED INDUSTRIES. G. S. Fawcett. *J. Soc. Dyers Col.*, June 1937, P. 226–33.

The principles of colorimetry, particularly with relation to the Lovibond color system and instruments. (C)

CONTINUOUS BLEACHING PLANT. H. Jaeger. *Textilber.*, 1937, V. 18, P. 226–28; abs. in *J. T. I.*, June 1937, P. A315.

An account is given of plant in which cloth in open width is subjected to treatment with boiling caustic soda, washing, chlorine bleaching, washing, souring, washing, blueing, and drying in a continuous process. Productions up to 1800 metres per hour are possible or double this amount if two cloths are run side by side. Continuous working from Monday morning to Friday evening, with a change of shift every eight hours, and cleaning of the plant on Saturday, is recommended. (C)

COTTON: EFFECT OF MERCERIZATION ON. DETAILED DESCRIPTION OF CHANGE WHICH TAKES PLACE DURING THE PROCESS. S. M. Neale. *Tex. Rec.*, June 16, 1937, P. 51–2; abs. in *C. A.*, 1937, V. 31, Col. 6013. (C)

COTTON-STAPLE FIBRE FABRICS: BLEACHING. H. Baier and W. Hundt. *Textilber.*, 1937, V. 18, P. 301–4; abs. in *J. T. I.*, July 1937, P. A374. (C)

CREASE-RESISTANT FINISHING MATERIALS. "Chemitex." *Tex. Col.*, Sept. 1937, P. 603. (C)

CROCK TESTS: SOME FEATURES OF. Walter C. Durfee. *Am. Dye. Rptr.*, July 26, 1937, P. 446–47. (C)

DELUSTERING AND DYEING WITH COLORED PIGMENTS. A. H. Pettinger. *Silk and Rayon*, 1937, V. 11, P. 58; abs. in *C. A.*, 1937, V. 31, Col. 5167.

Some uses of pigments in coloring fibres are described. (W)

DISCHARGE PRINTING ON ACETATE RAYON. J. M. Hill. *Silk J. Rayon World*, 1937, V. 14, No. 157, P. 14; cf. *C. A.*, V. 30, Col. 5418; abs. in *C. A.*, 1937, V. 31, Col. 6013. (W)

DYEHOUSE FAULT RECORDS: APPLICATION. R. Lassé. *Textilber.*, 1937, V. 18, P. 102–3, 157–58; abs. in *J. T. I.*, June 1937, P. A316.

A general discussion of the difficulty of matching patterns, batches which must be counted unsatisfactory and the causes of the faults, the desirability of recording occurrences and causes of faulty batches, and the usefulness and value of the records. (C)

DYEING AND FINISHING CHARACTERISTICS OF BEMBERG. E. Higgs. *J. Soc. Dyers Col.*, Aug. 1937, P. 305–10.

DYEING OF MIXED FABRICS: WHAT THE SPINNER AND DYER SHOULD KNOW ABOUT. J. Menzinger. *Spinner u. Weber*, 1937, V. 55, No. 9, P. 26–8; abs. in *C. A.*, 1937, V. 31, Col. 4123.

A review dealing with single- and double-bath methods. (W)

DYEING OF WOOL AND WOOL-SPUN RAYON MIXTURES: NEW EXPERIENCES IN THE FIELD OF. K. Jochum. *Klepzig's Textil-Z.*, 1937, V. 40, P. 294–8; abs. in *C. A.*, 1937, V. 31, Col. 5167.

A discussion of various treatments. Numerous dyes are listed which are suitable for dyeing a no. of different combinations of wool and wool-spun rayon mixts. (W)

DYEING TOPS: MODERN SYSTEM FOR. *Am. W. & C. Rptr.*, July 29, 1937, P. 25–6, 33.

Describes features and advantages of the Abbott process, first developed for worsted tops, but also used for yarn and rayon top. (C)

DYEING WOOL FOR AUTOMOBILE UPHOLSTERY. B. Lerroux. *Tiba*, 1937, V. 15, P. 163–9; abs. in *C. A.*, 1937, V. 31, Col. 4502.

Practical operating directions are given in connection with dyeing and chroming in a single bath, dyeing after chroming, and dyeing with subsequent chroming. (W)

"ELECTROFIXER" STEAMER: APPLICATION. H. Aubauer (I. G. Farbenindustrie A.-G.), *Textilber.*, 1937, V. 18, P. 308; abs. in *J. T. I.*, July 1937, P. A375.

The need for careful control of conditions when steaming in the Mather-Platt machine in the printing of vat dyes is discussed and reference is made to the Colloresin process in which the goods are printed with a paste from which the alkali and reducing agent are omitted, dried, padded with an alkaline solution of hydrosulphite, and then heated to the required temperature with steam. The function of the steam in this process is to produce the temperature necessary for releasing the reducing action of the reducing agent and it is not required to condense moisture on the goods or in the color so that accurate control is not necessary. In the Electrofixer heat is supplied electrically and the procedure is similar to that of the Colloresin process. As the goods pass through, a steam and temperature equilibrium is established which ensures regular results. The steam content can be controlled by the production of additional steam in the Electrofixer or the addition of fresh steam. Variations of the temperature of the apparatus and of the steam within comparatively wide limits do not have any disturbing effect. The Electrofixer can also be used for the fixing of Rapidogen dyes and in discharge printing processes but it cannot be regarded as a substitute for the Mather-Platt for all printing processes. It is, however, a marked improvement on the Colloresin steamer. (C)

ENZYMES: PREPARATION AND APPLICATION. N. Bourguignon. *Tiba*, 1937, V. 15, P. 13–23, 85–95; abs. in *J. T. I.*, June 1937, P. A314.

A general account is given of the preparation of enzymes, methods of separating them from their solutions, the velocity of enzymatic reactions, the results of recent investigations of proteolytic diastases, methods for the determination of enzymatic and diastatic compounds, and the use of enzymes in the de-sizing of textile materials. (C)

FADING OF DYEINGS ON CELLULOSE ACETATE RAYON. F. M. Rowe and K. A. J. Chamblerain. *J. Soc. Dyers Col.*, July 1937, P. 268–78.

Discusses the action of "burnt coal gas fumes" (oxides of nitrogen, etc. in the atmosphere) on cellulose acetate rayon dyes, notes the dyes that

are most and least resistant, and concludes as follows: "The greatest care should be taken to ensure that cellulose acetate rayon materials, particularly those dyed blue or violet, are not stored, displayed, or laundered, etc., close to gas burners, electric heating elements, etc. This simple precaution would prevent much loss due to damage caused by the destructive action of oxides of nitrogen on many of these dyes." (C)

GELATIN AND GLUE IN DYEING AND FINISHING: USE OF. P. Colomb. *Teintex*, 1937, V. 2, P. 328–40; abs. in *C. A.*, 1937, V. 31, Col. 6010.

Review of the properties of gelatin and glue and of their uses in dyeing, finishing and sizing. A large no. of practical recipes are given. (W)

HYPOCHLORITE BLEACHING BATHS: EFFECT OF ADDITION OF SODIUM BICARBONATE. H. Wasser. *Textilber.*, 1937, V. 18, P. 225–26; abs. in *J. T. I.*, June 1937, P. A315; *J. Soc. Dyers Col.*, June 1937, P. 260.

Bleaching tests with neutral sodium hypochlorite with and without additions of sodium bicarbonate showed that the addition of the bicarbonate produced a better white. The addition makes the neutral liquor slightly alkaline and it is suggested that the better white is due to the better washing action of the weakly alkaline liquor. An even better white was obtained by bleaching with a commercial hypochlorite solution which contained a certain amount of alkali, and addition of sodium bicarbonate to this solution was not advantageous. Comparing the various bleaching solutions used, it was found that the whiteness of the bleached samples improved with increasing pH of the solutions. Strength tests showed practically no change due to bleaching with the commercial hypochlorite and appreciable losses in strength after bleaching with neutral hypochlorite and also with both commercial and neutral hypochlorite containing sodium bicarbonate. The differences between the effects on strength of the different bleaching treatments were accentuated by an alkali boil after bleaching. Measurements of the pH at the beginning and end of the bleaching operation showed that sodium bicarbonate can act as a buffer in the hypochlorite liquor. (C)

GLYCERINE: REPLACING—IN CALICO PRINTING BY UREA, HEXAMETHYLENETETRAMINE, SODIUM METAPHOSPHATE, AND THE LIKE. Hanns Gerber. *Mell. Textilber.*, 1937, No. 7, P. 527.

Glycerine makes printing colors more pliable and especially more viscous, thereby securing a more even distribution of the printing color on the rollers and screens with less friction. Since glycerine is very hygroscopic, moist steam can penetrate much more easily into the dry printing colors during ageing, so that the dyestuffs are more readily dissolved out of the thickening and are more completely applied to the fibre. A series of experiments with organic and inorganic compounds yielded results, however, which not merely rivalled the effect of glycerine, but in many cases proved to be even superior. These experiments were carried out with urea and its derivatives, thiourea and guanidine, and tests were begun with hexamethylene-tetramine and anhydrous phosphates. The use of urea for calico printing is not unknown. For example, the I. G. Farbenindustrie Aktiengesellschaft has patented a process for the fixation of pigments on textile fibres by the condensation of urea with formaldehyde. It has hitherto been used only to a very limited extent as a dispersing agent for dyestuffs, but it is just this property, which urea possesses to a great extent,

that makes it appear suitable as a substitute for glycerine. Guanidine, on the contrary, could only be used successfully with dyestuffs in alkaline solution, that is to say, with vat dyes, Rapidogen, Rapid Fast, and Indigosol dyes. Tetracarnit can be very successfully used, however, also for printing with all other classes of dyestuffs, as well as with vat dyes as a dispersing and wetting agent instead of glycerine. Besides these organic compounds, experiments have also been carried out with anhydrous phosphates. Sodium metaphosphate has proved to be the equal of glycerine in every respect and is even superior to it in its levelling and dispersing properties. The substitution of the compounds mentioned for glycerine may be regarded as having proved satisfactory in every respect. (C)

HYPOCHLORITE BLEACHING INVESTIGATIONS. J. Dumas. *Rev. gen. mat. color*, 1937, V. 41, P. 251–2; abs. in *C. A.*, 1937, V. 31, Col. 6010.

A discussion and comparison of various investigations. Chloroamines are more sol. in alkalies than in acid, therefore hypochlorite rendered alk. gives better results in practice. (W)

KNITTED INTERLOCK FABRIC. A. J. Hall. *Canadian Tex. J.*, Sept. 3, 1937, P. 35–6.

Dyeing with direct, benzo fast copper and vat dyestuffs. Methods of avoiding defects and producing shades fast to light and washing. A previous article of this series gave consideration to the preparation of the fabric for dyeing by bleaching with sodium hypochlorite. (C)

MERCERIZATION: BIBLIOGRAPHY OF. S. M. Edelstein and Wm. H. Cady. *Am. Dye. Rptr.*, July 26, 1937, P. 447–60.

The authors have assembled in one list the references to practically all of the journal articles on mercerization and related subjects which have appeared since the publication of Mercer's original patent in 1850, to the end of 1935. All articles are grouped according to the year of their publication, and all those published in the same year are arranged alphabetically by their authors' names. The reference to each article is followed wherever possible by a reference to an abstract of the article in some standard abstract journal. All the titles of foreign articles are given in English. For the convenience of those who wish merely to acquire a general knowledge of mercerizing, a list of books, arranged chronologically, is included. (C)

MERCERIZATION OF COTTON GOODS: PRODUCTION OF MAXIMUM LUSTER DURING THE. E. Meissner. *Deut. Wollen-Gewerbe*, 1937, V. 69, P. 439–40, 455–6; abs. in *C. A.*, 1937, V. 31, Col. 4823. (W)

MERCERIZATION OF MIXED SPUN YARNS. Walter Hees. *Mell. Textilber.*, 1937, V. 18, P. 367–70, 446–8; abs. in *C. A.*, 1937, V. 31, Col. 6015.

Mercerization of mixed cotton and rayon yarns was accomplished by employing a high rinse-water temp. (75–80°) during the fixation following the alkali passage; and by neutralizing at once in a continuous procedure, without cold after-rinsing, in a strong H_2SO_4 bath at high temp. (45°). The behavior of viscose rayon upon mercerization was tested with regard to fibre structure and dependence on degree of maturity. Rayon from unripe viscose of the type of Vistrafaser HB has favorable properties.

Several microscopic tests for judging mercerized mixed yarns were worked out: (1) differentiation of cotton and rayon fibres by a modified iodine coloration method, which employs the characteristic I absorptive capacity of the two fibres under certain conditions; (2) detn. of the fibre width of mercerized rayon at swelling equil., which in comparison with unmercerized fibres gives a value for the strength of deformation; (3) establishment of the degree of fibre deformation by detn. of the interference colors in the polarizing microscope. (W)

MERCERIZED YARN: VARIATIONS IN THE REMOVAL OF PECTIC SUBSTANCES FROM COTTON YARN IN THE MERCERIZATION PROCESS AS A SOURCE OF DYE AFFINITY VARIATION IN. Sidney M. Edelstein. *Am. Dye. Rptr.*, July 26, 1937, P. 427–32. (C)

METAL THREAD FABRICS: BLEACHING. W. Hundt. *Textilber.*, 1937, V. 18, P. 228; abs. in *J. T. I.*, June 1937, P. A315.

Cotton fabrics containing metal effect threads composed of copper or brass should be bleached in open width on a jigger with hydrogen peroxide solution containing water glass, soap and Lamepon A at a temperature of 70–75° C. The treatment is repeated once or twice, and the goods are then washed, soaped and washed. (C)

NAPHTHOL YELLOW S: NEW METHOD FOR IDENTIFICATION OF—AND A SUGGESTED MECHANISM OF ITS FADING. H. H. Hodgson and E. W. Smith. *J. Soc. Chem. Ind.*, 1937, V. 56, P. 108T; abs. in *C. A.*, 1937, V. 31, Col. 4500. (W)

OXIDATION OF FINISHING OILS. Raymond A. Pingree. *Am. Dye. Rptr.*, July 12, 1937, P. 379–83.

The paper outlines some of the accepted theories regarding the mechanism and the causes of fat decomposition, methods for determining the extent of the susceptibility to oxidation, and means of preventing or retarding this decomposition. Thirty-nine references. (C)

OXIDATION OF INDIGOSOL: NEW METHOD OF—BY THE AMMONIUM CHLORATE PROCEDURE. Berthelin. *Teintex*, 1937, V. 2, P. 91–2; abs. in *C. A.*, 1937, V. 31, Col. 4819. (W)

OXIDATIVE DYEING: MECHANISM OF. I. MECHANISM OF MATURING OF ANILINE BLACK IN THE DYEING OF FUR. E. K. Zil'berkveit and L. A. Vasil'ev. *J. Applied Chem.* (U. S. S. R.), 1936, V. 9, P. 2231–44 (in German P. 2245); abs. in *C. A.*, 1937, V. 31, Col. 5166. (W)

OXYCELLULOSE: DETERMINATION OF—DURING THE BLEACHING OF CELLULOSE FIBRES. Aug. Hajek. *Textilni Obzor*, 1936, V. 33, P. 10, 30, 52, 112, 122, 134; *Chem. Obzor*, V. 11, *Abstracts*, P. 102; abs. in *C. A.*, 1937, V. 31, Col. 4126.

The damage of cotton goods can be estd. from the detn. of the formed aldehyde and COOH groups. For detg. aldehyde groups H. modifies the Dokkum iodometric Cu method, expresses the analyses in reduced Cu units, finds that the results confirm the theoretical changes occurring in the fibre

but do not agree with the changes in tensile strength of the fibres. The Götz ($AgNO_3$–AcONa) method proved unsuitable for the detection of aldehyde groups. The qual. test with Nessler's reagent upon linen goods was satisfactory but was subjected to the restriction that the reagent gives a color similar to that of oxycellulose with some of the noncellulose components of linen fibres. The Kaufmann permanganate method was suitable for cotton and for regenerated cellulose but not for treated cellulose fibres, for many of the processes introduce non-cellulose-reducing substances into the fibres. H. was not able to express the quantity of reducing substances in terms of the tested cellulose, for the hydrolysis depended upon the surface area of the exposed fibres. (W)

OXIDATION (URSOL) DYEING. E. K. Zil'berkveit and V. P. Drobinskaya. *J. Applied Chem.* (U. S. S. R.), 1936, V. 9, P. 862–77 (in German P. 878); cf. *Byull. Tsentral. Nauch.-Issledovatel. Lab. Soyuzhemproma*, 1934, V. 3–4, P. 89, 112; abs. in *C. A.*, 1937, V. 31, Col. 3283. (W)

PEROXIDE BLEACHING OF COTTON GOODS. V. I. Minaev and N. N. Kuzub. *Byull. IvNITI*, 1936, V. 12, No. 6, P. 3–19; abs. in *C. A.*, 1937, V. 31, Col. 3288. (W)

PILE FABRICS: PILE FIXING TREATMENT. *Textilber.*, 1937, V. 18, P. 239–40; abs. in *J. T. I.*, June 1937, P. A320.

In order to fix the pile of corduroy and velvet more firmly and prevent its removal during mechanical treatment, washing and wear, the back of the fabric is treated with an alkaline solution of Azolon FLM, a product having a cellulose basis, and then with sulphuric acid-sodium sulphate, in order to precipitate a thin film on the back of the fabric. Details of the procedure are given. After this treatment the goods are dyed and finished in the usual way. (C)

PREVENTION OF CALCIUM DEPOSITS IN PROCESSING WATER. B. H. Gilmore. *Rayon Tex. Mo.*, July 1937, P. 78–9.

Sodium metaphosphate and sodium pyrophosphate are compared on the basis of their relative effectiveness in preventing the precipitation of calcium orthophosphate, calcium carbonate and calcium soaps. Sodium metaphosphate is more effective than sodium pyrophosphate both on the basis of the relative quantities necessary to prevent precipitation and on the basis of their relative tolerance for calcium ion in the presence of the precipitants studied. (C)

PRINTING: PREPARING SILKS FOR. J. M. Hill. *Silk J. Rayon Wld.*, 1937, No. 153, P. 35, 37; abs. in *C. A.*, 1936, V. 30, Col. 5418; 1937, V. 31, Col. 3283.

The ultimate brilliance of prints on silk is dependent on the preparatory process of degumming. Contrary to dyeing for which some gum may be retained, complete removal of the gum is the aim. Several excellent treatments on numerous types of silks are described. (W)

PROTECTION OF THE WOOLEN FIBRE DURING CHEMICAL WET TREATMENTS IN TEXTILE-FINISHING PROCESSES. Karl Ullrich. *Wollen- & Leinen-Ind.*, 1937, V. 57, P. 32–4, 45–6; abs. in *C. A.*, 1937, V. 31, Col. 3699. (W)

RAYON PRINTING: EFFECT OF EXCESSIVE PRESSURE IN. "Technicus." *Rayon Tex. Mo.*, Aug. 1937, P. 67–9.

Excessive pressure is detrimental to the brightness of print colors generally. The printer's slogan should be *the less pressure the more* bloom. The author describes methods by which excess pressure may be avoided. (C)

RAYON: PRODUCTION OF COLORED. H. Roche. *Silk and Rayon*, 1937, V. 11, P. 242–4, 320, 345; abs. in *C. A.*, 1937, V. 31, Col. 5168.

A no. of practical methods are outlined. (C)

REACTION POSSIBILITIES OF BLEACHING LIQUORS CONTAINING CHLORINE. Hans J. Henk. *Monatschr. Textil-Ind.*, 1937, V. 52, P. 86; abs. in *C. A.*, 1937, V. 31, Col. 4126. (W)

REMOVING IRON FROM WATER FOR CHROME DYEING. Collé. *Mell. Textilber.*, 1937, No. 7, P. 520.

There are a number of chrome dyes that are more or less strongly influenced by the iron present in water, sometimes leading to the formation of color lakes with their own peculiar color by the action of the iron salts, in the same way as with chromium compounds, and sometimes the iron destroys the dyestuff. The dyer has accordingly the task of preventing the occurrence of iron in the water, or of controlling the quantity present, which must not exceed 0.1 mg. per litre. By the addition of 0.25% potassium chromate to the dyebath, the harmful effect of iron upon a large number of chrome dyes can be reduced to a minimum or altogether eliminated. The conditions are similar when applying the metachrome process, where the metachrome mordant present counteracts the injurious effect of any iron in the dyebath. There are also many dyestuffs at the disposal of the dyer which resist the action of iron to a great extent. Author enumerates these and states that it is possible to secure reliable chrome dyeings with these dyestuffs even when iron is present in the water. (C)

SCOURING OF RAYON: SOME ASPECTS OF THE. Robert Zametkin. *Am. Dye. Rptr.*, Aug. 9, 1937, P. 480–82. (C)

SELF-DEVELOPING DYES: APPLICATION. J. S. Turski. *Textilber.*, 1937, V. 18, P. 75–7; abs. in *J. T. I.*, May 1937, P. A263.

Various aminoanilides, aminodiphenyldiamides and similar compounds give on diazotization products having self-developing powers. Azo dyes may be produced on textile fibres by the self-development of such products. The fibre is impregnated with an alkaline solution of the amino compound, treated with an acidified nitrite or nitrous acid solution, and the diazonium compound on the fibre neutralized. With solutions acidified with acetic acid, diazotization proceeds slowly and self-development takes place at the same time. When solutions containing hydrochloric or sulphuric acid are used, the developing process does not occur until after neutralization. The preparation of the solutions, the nature of the reaction, the colors obtained with different compounds, and the fastness of the dyeings are discussed. Other possible methods of application of self-developing dyes are also discussed. (C)

SILK FIBROIN: EFFECT OF REGAIN ON THE RATE OF ADSORPTION OF STANNIC CHLORIDE BY. G. V. Jansen and E. A. Smith. *Can. J. Rsch.*, 1937, V. 15B, P. 53–64; abs. in *C. A.*, 1937, V. 31, Col. 2827. (W)

SIZING AND DESIZING OF RAYON WARPS. R. Morand. *L'Ind. Text.*, 1936, P. 553; abs. in *Rayon Tex. Mo.*, June 1937, P. 103.

After reviewing a number of patent products and processes for the sizing of rayon, the author discusses briefly the desizing of rayon. He shows how traces of size may be detected in the desized materials. (C)

SIZING RAYON AND SYNTHETIC YARNS. SURVEY OF CURRENT TECHNIC, SIZE MATERIALS, MACHINES AND METHODS. W. A. Harper. *Tex. Wkly.*, 1937, V. 19, P. 144, 146–7, 209–11; abs. in *C. A.*, 1937, V. 31, Col. 2441. (W)

SOAKING SILK AND RAYON YARNS: METHODS OF. Henry Miedendorp, Jr. *Rayon Tex. Mo.*, July 1937, P. 73–4. (C)

SODA PRINTS ON PILE FABRICS. B. S. Hillman. *Rayon Tex. Mo.*, 1937, V. 18, P. 94–6; cf. *C. A.*, V. 30, Col. 7854; abs. in *C. A.*, 1937, V. 31, Col. 4501.

Soda printing is applied to fabrics composed of an animal fibre and a vegetable fibre, one of which is eaten away or carbonized in the process. Ordinary transparent velvet is the most common type of cloth soda-printed. For carbonizing vegetable fibres the chemical most commonly used is $AlCl_3$, but $Al_2(SO_4)_3$ and H_2SO_4 are also used. The best and cheapest chemical for cutting animal fibres is *NaOH*. For thickening, various gums are used, including British, tragacanth and carob tree. It is very difficult to obtain complete evenness of shade. Typical dyes fast to caustic printing include Naphthol AS, Sulfogene yellow GA, Ponsol golden orange RRT, Naphthol ASSW and Diazine black V. After printing, cut-out velvets are heated at 290–310°. Animal fibres printed with caustic are first dried at a fairly low temp. and then steamed. (W)

SPECTRAL ABSORPTION AND FLUORESCENCE OF DYES IN THE MOLECULAR STATE. E. E. Jelley. *Nature*, Dec. 12, 1936, P. 1009–10. Abs. from *Eastman Kodak Bull.*, July 1937.

Certain dyes are found to exhibit a characteristic absorption spectrum associated with fluorescence of slightly longer wave length, on precipitation from their solutions, before they become crystalline; and it is held that they are then in a molecularly disperse state. The author describes the preparation of such disperse systems of a ψ-cyanine dye in both liquids and solids. They show an unusually narrow absorption and fluorescence band, analogous to that of the ruby. (S)

STAIN REMOVERS: NEW. Pegasus. *Tex. Col.*, Sept. 1937, P. 610, 636.

First instalment of a series of articles describing the newer stain-removers. (C)

STANNOUS CHLORIDE IN THE PINKING PROCESS IN TURKEY RED DYEING: REACTIONS AND EFFECT OF. Walter Hees. *Mell. Textilber.*, 1937, No. 7, P. 525.

The most diverse theories have been propounded about the chemism of pinking which may for the most part be classified in two groups. Accord-

ing to one view, the thin compound is said to enter the color lake, while the second view denies that a tin lake is formed in clearing. Every Turkey red dyer well knows that the fibre is often injured when the pinking process is not properly carried out. Some time ago, the author was able to show that the injury done was due to the formation of hydrocellulose and in this connection laboratory experiments were able to clear up at the same time the chemism of the pinking process and the splitting of the thermo-labile tin compounds under pressure. The conclusion could be drawn from the results that the temperature of the pinking process exerts a decisive influence upon the capability of the tin compounds for splitting up and that the effect of the thermolabile decomposition products on the cotton fibre must vary according to the temperature. The chemism of the pinking process is shown in a reaction diagram. (C)

SULFONATED (SULFATED) OILS: DETERMINATION OF ALKALINITIES AND ACIDITIES IN. Ralph Hart. Committee Report No. 6 (concluded). *Rayon Tex. Mo.*, June 1937, P. 86–7. (C)

SULFUR IN WOOL: DETERMINATION OF. P. Larose and A. S. Tweedie. *Can. J. Rsch.*, 1937, V. 15B, P. 65–74; abs. in *C. A.*, 1937, V. 31, Col. 2825.

A modification of Pregl's micromethod for the detn. of S in org. compds. is satisfactory and convenient when applied on a macro scale to wool. The investigation of various methods of cleaning the samples shows that the best results are obtained when the wool wax is extd. with a solvent before washing with H_2O. A treatment with dil. HCl is not necessary in prepg. the sample. Three different procedures have been followed in detg. the dry wt. of the sample. Results obtained by the new method are compared with those obtained by other recognized methods, and the agreement with the results of the Benedict-Denis-Barritt method is shown to be very good. (W)

WOOL: FAST CHROME DYES FOR THE DYEING OF. Gerd Nitschke. *Monat. schr. Textil-Ind.*, 1937, V. 52, P. 86–7; abs. in *C. A.*, 1937, V. 31, Col. 4123.

The use of the fastest and most important Cr dyes is described in detail. It is inadvisable to lower the fastness of a fast Cr dyeing by the addn. of too large an amt. of less fast acid dyes. The wool fibre reduces the sexivalent Cr to trivalent Cr unless another reducing agent is present. If this action is not carefully considered the goods may become friable. If formic acid is not employed the fibre can be protected during the Cr treatment by the addn. to the dyeing bath of oxalic or lactic acid which acts as a reducing agent. (W)

WOOL FINISHING PROCESSES: NECESSITY FOR SCIENTIFIC CONTROL. E. Elöd. *Textilber.*, 1937, V. 18, P. 49–51; abs. in *J. T. I.*, June 1937, P. A321.

A discussion on the liability of acids and alkalies to cause wool damage and on the influence of pH and temperature control in the scouring, drying, carbonizing, dyeing and chlorinating processes. Tables are given showing the dye absorption of carbonized and uncarbonized wool. (C)

IV. Research Methods and Apparatus

Akon and Kapok Fibre: Identification. N. J. M. Vorstman. *Chem. Weekblad,* 1936, V. 33, P. 746–47 (through *Analyst,* 1937, V. 62, P. 224); abs. in *J. T. I.,* July 1937, P. A390.

(Commercial varieties of "kapok" sometimes consist of or contain "akon" fibre from *Calotropis procera*). Staining tests to distinguish akon are not trustworthy but akon hairs have characteristic longitudinal markings that are rendered visible by racking the microscope objective up and down. These also appear as thickenings in cross-sections whereas the walls of kapok hairs are thin and uniform in section. Cross-sections are reproduced, with cotton sections for comparison. (C)

Copper: Determination in Textile Materials. Kehren. *Textilber.,* 1937, V. 18, P. 313–15; abs. in *J. T. I.,* July 1937, P. A393.

The determination of Cu in textile materials by the ferrocyanide and the diethyldithiocarbamate methods is discussed and some typical results are given. (C)

Cotton-spun Rayon Mixed Yarns: Determination of Composition of—by Means of Iodine. K. Schulze. *Monatsh. Seide Kunstseide,* 1937, V. 42, P. 173–4; cf. *C. A.,* V. 30, Col. 1570; abs. in *C. A.,* 1937, V. 31, Col. 5170.

The following method can be used for detg. the compn. of cotton-spun rayon mixed yarns contg. mercerized or non-mercerized cotton and viscose or cuprammonium-spun rayon: Samples of the mixed textile are tied together and without previous wetting are placed for 1 min. in 150 cc. of a 20° soln. contg. 20 g. I and 150 g. KI per 100 cc., squeezed out and washed twice (4 times in the presence of mercerized cotton) for 1 min. in 400 cc. of distd. water at 20°. After squeezing out, suspending and drying at room temp. the mixed fabric is analyzed mechanically as soon as the cotton has become completely decolorized. This happens quickly with raw and bleached cotton and requires several hrs. with mercerized cotton which had turned bluish black. Photomicrographs of various types of threads which had been subjected to this method show a decolorized pure cotton thread and a black pure viscose spun rayon thread. With mixed spun fabrics of cotton and viscose spun rayon the black spun rayon threads are clearly visible in the presence of the white cotton threads. The relative proportions of the constituents in the mixt. can be estd. from the photomicrograph. Various practical applications of this method are pointed out. (W)

Defects in Pure Silk and Rayon Stockings: Detection of. H. W. Ellinger. *Deut. Textilwirtschaft,* 1937, V. 4, No. 1, P. 20–3; abs. in *C. A.,* 1937, V. 31, Col. 5586.

A review of various phys. and chem. methods for the detection of mech. and chem. defects in silk and rayon stockings. (W)

Fluorescent Light Microscope: Application. E. A. Hauser and C. J. Frosch. *J. Opt. Soc. Am.,* 1937, V. 27, P. 110–11; abs. in *J. T. I.,* July 1937, P. A404. (C)

GLASS ELECTRODE: APPLICATIONS IN pH CONTROL. K. Schwabe. *Z. Elektrochemie,* 1937, V. 43, P. 152–55; abs. in *J. T. I.,* July 1937, P. A404. (C)

HEAT REISTANCE OF DYEINGS: DETERMINATION OF. K. Schwertassek. *Mell. Textilber.,* 1937, V. 18, P. 373–74; abs. in *J. Soc. Dyers Col.,* 1937, Aug. P. 338.

A simple type of apparatus has been developed and is described for use in determining the heat resistance of dyeings.

INSTRUMENTATION STUDIES. XIX. PHOTOELECTRIC DEVICE FOR THE OBJECTIVE MEASUREMENT OF LIGHT SCATTERED BY SMALL PARTICLES, AND SURFACE FUZZ OF PAPER. Staff of Institute of Paper Chemistry. *Paper Trade J.,* Aug. 26, 1937, P. 33–5.

Describes a photoelectric device which is sufficiently sensitive to measure quantitatively the light scattered from an isolated fibre; also a new instrument specifically designed for the objective measurement of surface fuzz of papers. Both of these devices may have textile uses. (C)

LANITAL FIBRE: SOME REACTIONS FOR DETECTION OF. H. Rath and R. Burkhardt. *Klepzig's Textil-Z.,* 1937, V. 40, P. 292–3; abs. in *C. A.,* 1937, V. 31, Col. 5167.

Previous methods for the differentiation of the lanital fibre (*A*) from wool and other textile fibres are based on differences in the compn. and chem. property of the chief ingredient of *A*, casein and the wool proper. The new method depends upon the identification of formaldehyde which occurs in *A* and in no other textile fibre. HCHO is used for the condensation and hardening of the casein during the spinning operation. The fairly stable HCHO-casein condensation product forms the outer layer of *A*. Method: Boil a sample of the material for a few min. in distd. water contg. a little H_2SO_4 and add the aq. ext., drop by drop, to a 0.1% concd. H_2SO_4 soln. of carbazole. Upon strong heating the soln. turns deep blue immediately and forms a blue ppt. after some time. The test is sensitive to traces of HCHO (1: 10,000). In the absence of *A* the soln. turns faintly red or forms a white ppt. owing to the diln. of the pptg. carbazole. For dyed *A* the test is carried out as follows: Place the sample in a distg. flask contg. water acidified with H_2SO_4 and distil. Upon the addn. of the distillate to carbazole soln. the latter will turn deep blue if *A* was present. This method can also be used for the detection of *A* in mixed textile fabrics by distg. a sample of this mixt.; however, none of the other fabrics must contain any constituents which might liberate HCHO. An example of a fibre which interferes with this test by giving a similar reaction but to a much slighter extent is artilana. This fibre is a cellulose deriv., has been rendered capable of absorbing acid dyes by the incorporation of N-contg. substances and presumably has been subjected to a condensation process with HCHO. Artilana can be differentiated from *A* by a study of their cross-sectional pictures which differ greatly. With dyed material the same pos. test can be obtained from dyeings which have been aftertreated with HCHO and possibly also from dyes of the formylaminoanthraquinone type. However, if the dyeing has been removed with hyposulfite or hyposulfite-alkali which also takes

out the HCHO component of the dye then the remaining *A* will still give the pos. HCHO reaction. If the fibre mixt. contains a fibre which had been brightened with lactic acid then the aldehyde formed from this acid will interfere with this test. This can be avoided by a light soap wash or distn. in alk. rather than in acid medium. Another method of detection is based upon the use of diazotized sulfanilic acid (Pauly's reaction) as a test for tyrosine which is homogeneously distributed in *A*. *A* contains 4.5% tyrosine and on treatment with diazotized sulfanilic acid gives the intensive red color immediately. The tyrosine of wool (4.8%) is located in the keratin-C layer; wool, therefore, will give a neg. test with this reagent unless its upper layer has been partly destroyed. (W)

LUSTER DETERMINATION WITH A PHOTOELECTRIC PHOTOMETER. Henry Ransom and Sidney M. Edelstein. *Am. Dye. Rptr.*, July 26, 1937, P. 432–37. (C)

OIL, SOAP AND OTHER EXTRANEOUS MATTER IN TEXTILE MATERIALS: METHODS OF DETERMINING. I. INVESTIGATION OF THE NATURE OF THE MATERIAL OBTAINED BY THE EXTRACTION OF WOOL WITH ETHYL ALCOHOL (a progress report). Bertil A. Ryberg. *Am. Dye. Rptr.*, July 26, 1937, P. 461–67. (C)

THERMOELECTRIC METHOD FOR DETERMINING ATMOSPHERIC HUMIDITY. W. Bachmann. *Arch. Hyg. Bakt.*, 1936, V. 117, P. 139–43 (through *Brit. Chem. Abs. B.*, 1937, V. 56, P. 396); abs. in *J. T. I.*, June 1937, P. A337.

The current generated between a "dry" and a "wet" element is measured and the values at different air temperature and absolute humidity are used to calculate the relative humidity. (C)

VOLUMETRIC DETERMINATION OF ALPHA, BETA, AND GAMMA CELLULOSE IN PULPS AND PAPER: SIMPLIFIED. H. F. Launer. *B. S. J. Rsch.*, Mar. 1937, P. 333–42; abs. in *Eastman Kodak Abs. Bull.*, June 1937.

A relatively rapid and simple method for the determination of alpha, beta, and gamma cellulose is described. The method ordinarily employs a 0.3-gm. sample, which need not be weighed accurately, but a 0.03-gm. sample also gives fair results. Neither ash nor moisture determinations are involved; in fact, no precision weighings are made. The cellulose is oxidized by potassium dichromate solution, the strength of which need not be known accurately, as the concentrations of the oxidimetric solutions do not enter into the calculations. The volumetric results are in good agreement with those of a gravimetric method, and are reproducible, for widely different materials. The actual working time for four complete determinations is 1½ to 2½ hours. Fundamental facts recently found concerning the separation of the cellulose fractions have been incorporated in the method. A calculation based upon the volumetric and gravimetric data for alpha cellulose indicates that the pentosans in the pulps studied are distributed among the alkali-soluble and alkali-insoluble fractions in approximately the same ratio as cellulose. It was also found that the amount of beta cellulose which precipitates is dependent upon the temperature, and that the separation should be made without heating the acidified filtrate. (S)

WATER ABSORPTION OF TEXTILE FIBRES: DETERMINATION OF THE. E. Adam and P. Krais. *Monatschr. Textil-Ind.*, 1937, V. 52, P. 85; abs. in *C. A.*, 1937, V. 31, Col. 4127.

The water absorption of 0.5-g. samples of Cl Buenos Aires wool and of A/AA Austral. wool was detd. as follows: The samples were wetted with water squeezed by hand and placed in a small tin vessel with perforated bottom. The vessel was attached to a string and centrifuged 50 times at a velocity of 2 revolutions per sec.; 2–5 expts. yielded a uniformity of 92–93% in the results. The increase in wt. found after centrifuging expressed in percentage of the sample was taken as a measure of the water absorption and amounted to 97 and 288%. Several addnl. series of tests were conducted under varying conditions and with modifications of the procedure described. Results are given for various kinds of rayon and cotton. (W)

X-RAYS: USE OF—IN IDENTIFICATION AND ESTIMATION OF MIXTURES OF ALIPHATIC COMPOUNDS: USE OF. S. H. Piper. *J. Soc. Chem. Ind.*, Feb. 1937, P. 61T–66T; abs. in *Eastman Kodak Abs. Bull.*, June 1937.

Measurements of spacings, molecular weights, and transition temperatures of long-chain aliphatic compounds provide a means of analysis of naturally occurring waxes without separation of the components. (S)

V. ECONOMICS, PHYSICS AND MISCELLANY

AGEING OF ALKALI CELLULOSE. G. Saito. *Monats. f. Chem.*, 1936, V. 67, P. 141–58.

Alkali cellulose produced by the action of 18% caustic soda on cotton was examined in regard to ageing at various temperatures and in various atmospheres (air, oxygen, nitrogen, and carbon dioxide). Measurements of the viscosity of the alkali cellulose dissolved in Schweizer's reagent served as a criterion for the ageing. Measurements were carried out with various concentrations of cellulose. The part that oxygen plays in the ageing was discussed. When the alkali cellulose is preserved in an atmosphere of carbon dioxide, the caustic soda is converted into the acid carbonate and there is practically no decomposition due to ageing. The author shows that the particles of cellulose present in Schweizer's reagent exert reciprocal forces upon one another and upon the solvent owing to their elongated form, so that it is impossible to arrive at direct conclusions upon the length of the chains and the degree of depolymerization of the cellulose in solution by means of the degree of viscosity found. That reciprocal action also takes place at very low concentrations and leads to the determination of the molecular weight of cellulose. The author gives formulae for the determination of the length of the chains with due reference to the reciprocal action. Changes in the length of the chains which appeared when alkali cellulose was allowed to age under the conditions described were thereby determined. (X)

ANTIOXIDANTS AND AUTOXIDATION OF FATS. AUTOXIDATION OF OLEIC ACID, METHYL OLEATE, AND OLEYL ALCOHOL. L. A. Hamilton and H. S. Olcott. *Ind. Eng. Chem.*, 1937, V. 29, P. 217–23; abs. in *J. Soc. Dyers Col.*, July 1937, P. 290.

Oxidation of the above compounds has been studied in an apparatus which enables the oxygen absorbed, and the water and carbon dioxide

liberated, to be determined. The iodine, acetyl, acid, and saponification values, and the aldehyde and peroxide contents of the residue, were determined. In the initial reactions at the double bond, oleyl alcohol absorbed approximately 5 and methyl oleate and oleic acid approximately 4 atoms of oxygen; simultaneously, each compound loses 1 mol. water. The peroxide level in the early stages of oxidation is higher in oleyl alcohol and methyl oleate than in oleic acid. The double bond is destroyed more rapidly than would be expected if the reaction followed the unimolecular law. The formation of carbon dioxide is part of a reaction in which only half or less of the original material participates. Aldehydes seem to be transient intermediate products; they are formed and destroyed at nearly equal rates. (C)

CELLULOSE: POSITION OF THE ATOMS IN THE NEW SPACE FORMULA OF. K. H. Meyer and L. Misch. *Helv. Chim. Acta*, 1937, V. 20, P. 232–44; abs. in *J. Soc. Dyers Col.*, June 1937, P. 259.

X-ray analysis has confirmed the observation that native cellulose is formed of two families of cellobiose chains, of opposite orientation, lying parallel to the fibre axis *b*. In each chain all the interatomic distances correspond to the principal valency bonds; thus, the distance between carbon and carbon is 1.54 x 0.01 Å, and between carbon and oxygen is 1.45 x 0.03 Å. In the direction of the axis *a* these chains are linked by very strong residual valencies, manifested each time between two hydroxyl groups. The reticules parallel to the plane, *a*, *b*, are, therefore, formed of identical chains, and the distance between hydroxyl groups in the two chains is 2.6 Å. These reticules are joined together by secondary valencies to form a network. Thus, the orientations with respect to the *b* axis of adjacent reticules are always opposed. This arrangement of two families of chains of opposite orientation should be found in all cellulose derivatives, and particularly in the product known as cellulose hydrate, which is really only an allotropic modification of cellulose. (C)

CHEMICAL COMPOSITION OF CHITIN AND CELLULOSE. K. H. Meyer and H. Wehrli. *Helv. Chim. Acta*, 1937, V. 20, P. 353–62; abs. in *J. Soc. Dyers Col.*, July 1937, P. 298.

Similarities between the chemical properties of chitin and cellulose have been determined with particular reference to the influence of the acetylamino-group, which in chitin replaces a hydroxyl group of cellulose, on the chemical and physical properties of the former. Viscosimetric determination of the mol. wt., indicates that chitin obtained by chemical purification has the same mol. wt. as cellulose isolated from wood by a chemical process, and the similarity observed between the heats of activation of the hydrolytic degradation of chitin and cellulose is in agreement with the hypothesis that chitin contains the same type of β-linkages as cellulose. Chitin is soluble in mineral acids, but, unlike cellulose, is insoluble in zinc chloride, calcium thiocyanate or cuprammonium solutions. It cannot be mercerized and cannot be etherified as realily as cellulose. (C)

CHEMICAL STRUCTURE OF WOOL KERATINS. I. FRACTIONATION OF KERATINS. C. Stakheyewa-Kaverznewa and N. I. Gavrilow. *Bull. Soc. chim.*, 1937, V. 4, P. 647–54; abs. in *J. Soc. Dyers Col.*, July 1937, P. 299.

Wool has been separated by means of pancreatin into two substances, *viz.*, cellular and intracellular keratin. Cellular keratin is a very stable

compound, unaffected by boiling water or by digestion with pancreatin, and gives an X-ray diagram similar to that of wool itself, but it contains more nitrogen and sulphur, arginine and cystine, than wool. Intracellular keratin is not a typical keratin, since it is readily disintegrated by the action of pancreatin, and contains less nitrogen and sulphur than wool. (C)

CONSTITUTION OF THE KERATIN MOLECULE. J. B. Speakman and F. Townend. *Nature*, 1937, V. 139, P. 411–12; abs. in *J. Soc. Dyers Col.*, June 1937, P. 259.

New determinations have shown that wool contains 15.27% glutamic acid and 7.27% aspartic acid, the figures for seagull quill being 9.72% and 6.57% respectively. These data support the theory that the long paptide chains of wool are bridged by salt linkings formed from the acid side-chains of aspartic and glutamic acids and the basic side-chains of arginine, lysine, and histidine, and that the free acid and basic side-chains are chemically equivalent. (C)

DISPERSION OF LIME SOAPS BY MEANS OF ANION-ACTIVE FATTY SUBSTANCES. A. Lottermoser and H. Flammer. *Kolloid-Beiheft*, 1937, V. 45, P. 359–412; abs. in *J. Soc. Dyers Col.*, July 1937, P. 290.

Quantitative determination of the dispersing power of the saturated sodium alkyl sulphates, Igepon T, and sodium oleate by procedure described, indicates that the dispersing power is due to the highly-charged particles of small colloidal dimension. The hydroxyl ion concentration of liquors containing lime soap and dispersing agent increases with the concentration of the latter. This is attributed to hydrolysis of the molecularly dispersed lime soap particles and the hydrolytic adsorption of the dispersing agent by the particles of lime soap. Actually, two adsorption processes occur simultaneously, *viz.* molecular adsorption of the highly-charged colloidal particles and their hydrolytic adsorption. Washing experiments carried out under standard reproducible conditions, indicate that, in contrast to the detergent action of the anion-active fatty substances alone, in presence of lime soap there is an additional effect due to the action of the latter. A definite relationship has been established between the increase in the concentration of hydroxyl ions, or the strength of hydrolytic adsorption, and the detergent action. It is concluded that suitable mixtures of soap and dispersing agent can be prepared for use with hard waters to prevent deposition of lime soap on the fibre. (C)

DRYING GRANULAR SOLIDS. N. H. Ceaglske and O. A. Hougen. *Ind. Eng. Chem.*, July 1937, P. 805–13.

Describes experimental work tending to prove that the drying rate of granular substances is determined not by diffusion but by capillary forces. (C)

PAPER DRYING MACHINE: EFFICIENCY. R. J. Chambers. *Pulp and Paper Mag. Canada*, 1937, V. 38, P. 154–62; abs. in *J. T. I.*, June 1937, P. A314.

Factors affecting the performance of paper drying machines are discussed. The distribution of heat units in a typical drying operation is shown and each of the important heat uses are individually discussed. Curves are presented showing the effect on steam flows, efficiency, and

capacity of altering air volumes and moisture content of the paper entering the dryers. (C)

TEMPERATURE CONTROL: IMPORTANCE OF—IN THE TEXTILE INDUSTRY. Albert W. Chase. *Am. Dye. Rptr.*, June 28, 1937, P. 365–8.

Paper presented at meeting, Piedmont Section A. A. T. C. C., April 17, 1937. (C)

TERMINAL GROUPS AND THE CONSTITUTION OF CELLULOSE. K. Hess and F. Neumann. *Ber.*, 1937, V. 70, P. 728–33; abs. in *J. Soc. Dyers Col.*, June 1937, P. 259.

The method described for the quantitative determination of the terminal groups in polysaccharides by methylation, followed by hydrolysis and determination of the pentamethylglucose in the product, has now been applied to an investigation of the constitution of cellulose. Examination of the influence of various factors on the results has indicated that, when pretreatment of the fibre and methylation are effected in complete absence of air, no trace of pentamethylglucose can be detected in the hydrolysis product (a few mg. are detectable if present), so that substantially no terminal group of this type is present in natural cellulose. This implies that either natural cellulose is a closed chain, or that it is an open chain of such length (at least several times ten thousand $C_6H_{10}O_5$ residues) that the proportion of terminal group is too small to be detectable by the most refined methods available. Tables are included indicating the length of the cellulose chain in relation to the nature of the starting material, its pretreatment, the conditions under which it has been methylated, and the content of pentamethylglucose in the subsequent hydrolysis product. (C)

WOOD CELLULOSE: ADVANCES MADE IN THE MANUFACTURE OF—OF HIGH PURITY AND ITS EXPANDING USES FOR RAYON, CELLOPHANE, PLASTICS, ETC. R. S. Hatch. *Paper Trade J.*, July 22, 1937, P. 28–9. (C)